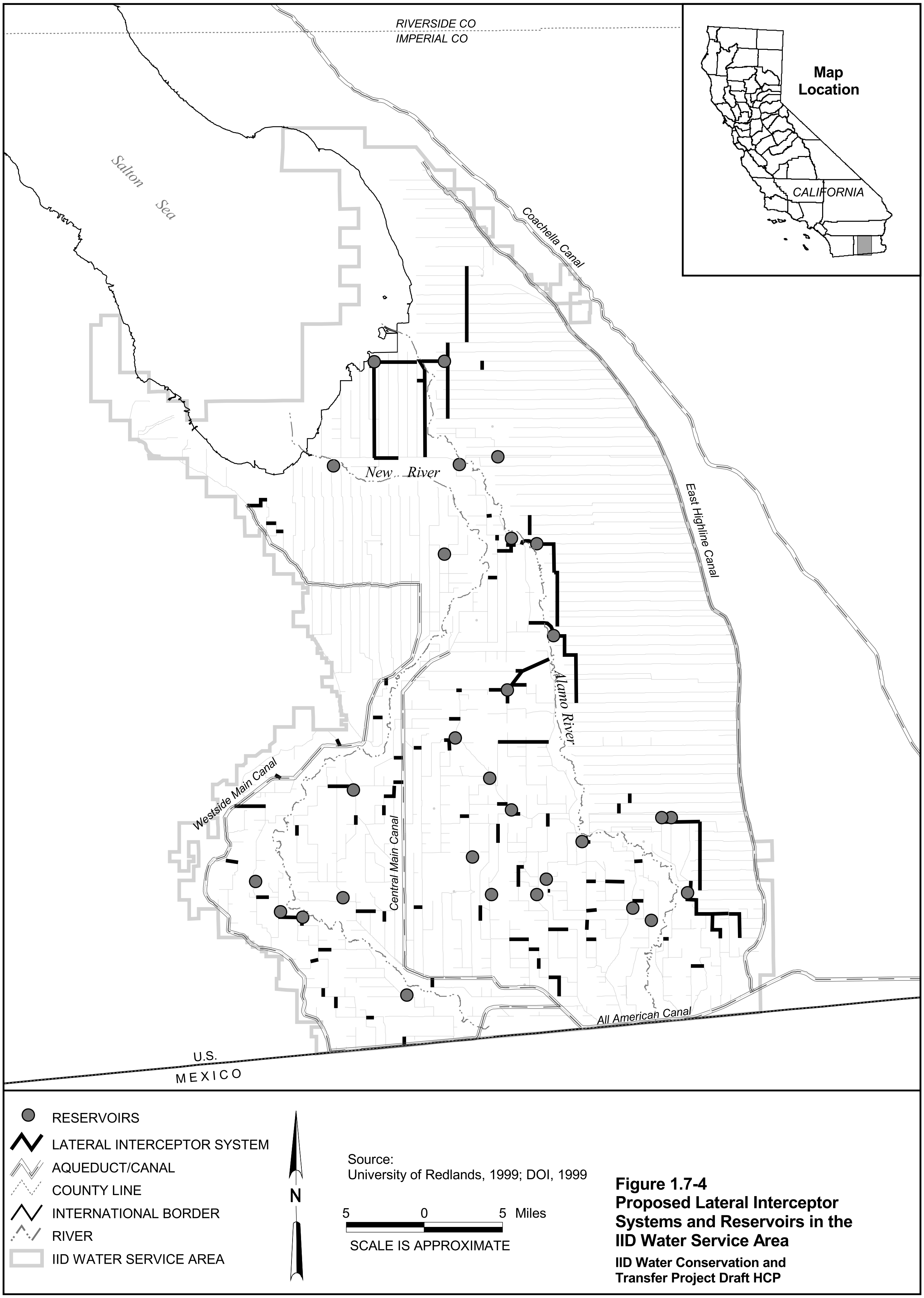

Figure 1.7-4
Proposed Lateral Interceptor Systems and Reservoirs in the IID Water Service Area
IID Water Conservation and Transfer Project Draft HCP

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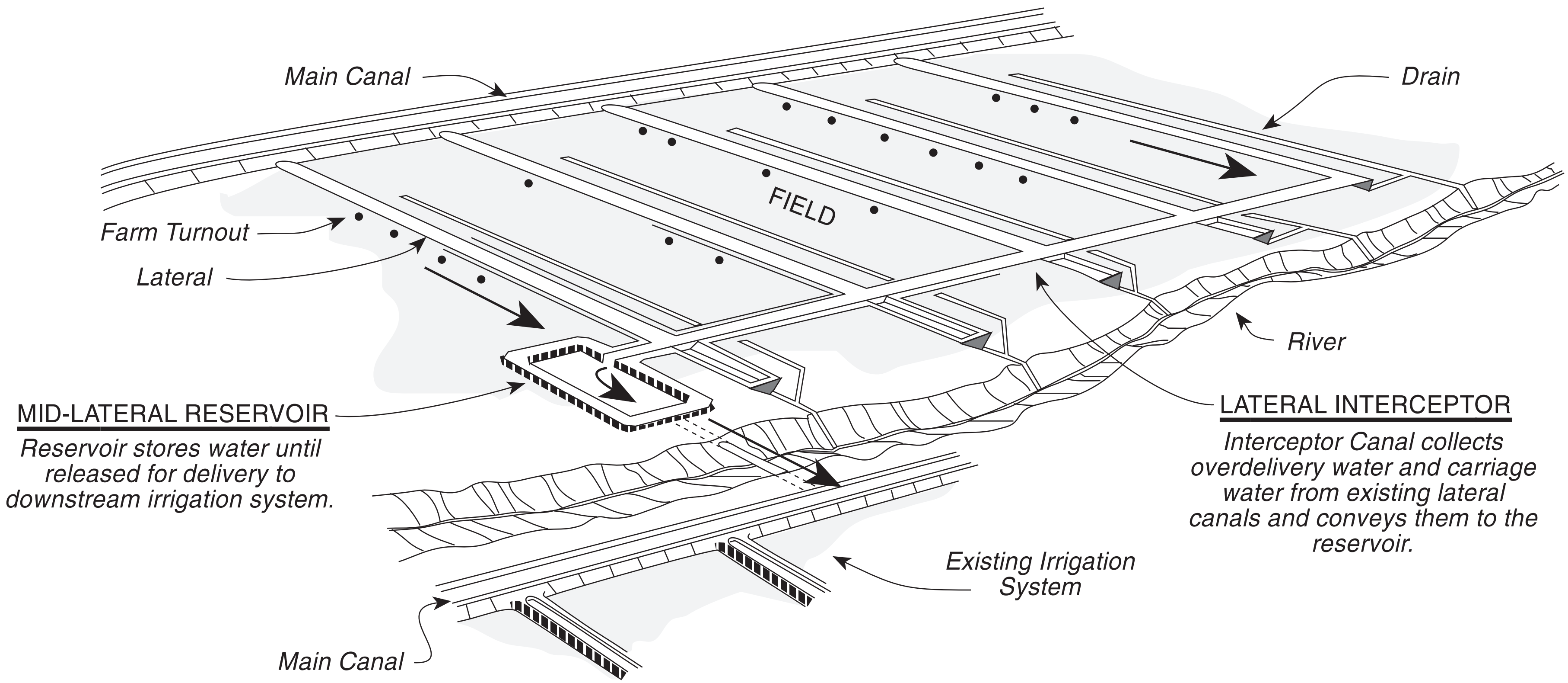

Figure 1.7-5
Conceptual Lateral Interceptor System and Mid-Lateral Reservoir
IID Water Conservation and Transfer Project Draft HCP

TABLE 1.7-3
Proposed Lateral Interceptors and Acreage Affected by Construction

Interceptor	Type	Length (miles)	Acreage Affected
Acacia	Canal	8.62	73.12
Ash	Canal	4.55	38.57
	Pipe	1.00	8.52
Elder	Canal	7.61	64.60
Fern	Canal	1.14	9.64
	Pipe	2.18	18.48
Holt	Canal	5.76	48.85
	Pipe	1.02	8.68
Niland	Canal	9.28	78.74
	Pipe	6.53	55.44
Orient-Oleander	Canal	4.17	35.35
	Pipe	1.52	12.86
Orita-Munyon	Canal	4.92	41.78
	Pipe	0.76	6.43
Peach	Canal	6.63	56.24
Redwood	Canal	8.52	72.31
	Pipe	2.01	17.03
Rockwood	Canal	1.00	8.52
	Pipe	0.50	4.26
Thistle	Pipe	0.80	6.75
Tri-City	Canal	5.00	42.42
	Pipe	0.50	4.26
Tri-Ex	Pipe	2.30	19.52
Vail	Canal	3.03	25.71
	Pipe	5.02	42.58
Wistaria	Canal	1.99	16.87
	Pipe	2.65	22.50
Total		**99.02**	**840.02**

achieved by reducing operational spills as a result of this mismatch of flows by storing excess supply water and then releasing this water in times of shortage demand needs.

Interceptor reservoirs enhance lateral interceptor system operations. They are typically placed at the end of the lateral interceptor canals to store intercepted flows (operational discharges) for reregulation rather than losing these flows to the drainage system. These stored flows are then later released for use in other delivery system canals as demand is required. These reservoirs would contain automated inlet and outlet structures that would enable the maintenance of the desired water flow. IID currently does not have any reservoirs in design, but anticipates constructing up to 100 reservoirs during the 75-year permit term. These reservoirs would be 1 to 10 acres in size, with a capacity ranging from about 5 to 30 AF. Construction of these reservoirs could encompass up to 1,000 acres.

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In addition to reservoirs constructed and operated by IID, many farmers in the Imperial Valley likely will construct small regulating reservoirs to facilitate the conservation of water. These 1 to 2-acre reservoirs would be constructed at the upper end of agricultural fields and are used to better regulate irrigation water applied to fields and to settle suspended solids prior to introduction into drip irrigation systems. These reservoirs would contain water only during irrigation operations and would remain dry during the remainder of the year. IID anticipates that these reservoirs could be used on up to 50 percent of the agricultural land in its service area. A single reservoir services about 80 acres of land. Up to about 5,900 acres of agricultural land could be converted to regulating reservoirs. This acreage is in addition to the 640 acres of agricultural land that could be converted to reservoirs in association with installation of lateral interceptors.

Seepage Recovery Systems

To conserve water, IID could install seepage recovery systems adjacent to the East Highline Canal. Existing and proposed locations of seepage recovery systems are shown in Figure 1.7-6. Surface and subsurface recovery systems conserve water by collecting canal leakage in sumps along a canal and pumping the water back into the same canal (Figure 1.7-7).

In a surface drain recovery system, seepage is captured and conveyed through open channels to a concrete sump. From there, it is pumped back into the canal. Construction required to install a surface recovery system is minimal. For a surface recovery system, a small check structure would be constructed in the existing parallel drain to pond water to a depth of about 3 feet. A pump station would return water to the East Highline Canal. These systems are proposed where there is an existing drain that collects seepage and directs the water to the drainage system.

In a subsurface recovery system, canal seepage flows are collected in a perforated pipe that then directs the water to a concrete sump. From there it is pumped back into a canal (Figure 1.7-7). Subsurface systems are proposed in areas lacking an existing parallel open drain. To install these systems, a trench is excavated and a pipe is laid in place. The pipeline outlets to a collection well consisting of an 8-foot-diameter vertical pipe from which the water is pumped back to the delivery canal. Construction disturbs an area about 70 feet wide along the pipeline. Table 1.7-4 shows the area that would be affected by construction of subsurface recovery systems. Following completion of the system, a right-of-way of about 70 feet along the pipeline is maintained free of deep-rooted vegetation.

1.7.3 Operation and Maintenance Activities

The primary purpose of this HCP is to provide the FESA and CESA compliance and incidental take authorization required to implement IID's water conservation obligations under the IID/SDCWA Transfer Agreement and the QSA. The water conservation programs will be an integral part of IID's ongoing operation. To implement the conservation program on a long-term basis, IID needs certainty regarding its ability to operate and maintain its irrigation and drainage system. For this reason, the covered activities include the range of IID's normal activities as well as water conservation-related activities. IID's normal activities consist of O&M activities associated with the diversion, measurement, conveyance, and delivery of Colorado River water to customers within the IID service area and the collection, removal, measurement, and transport of drainage waters to the Salton Sea. These activities are described below.

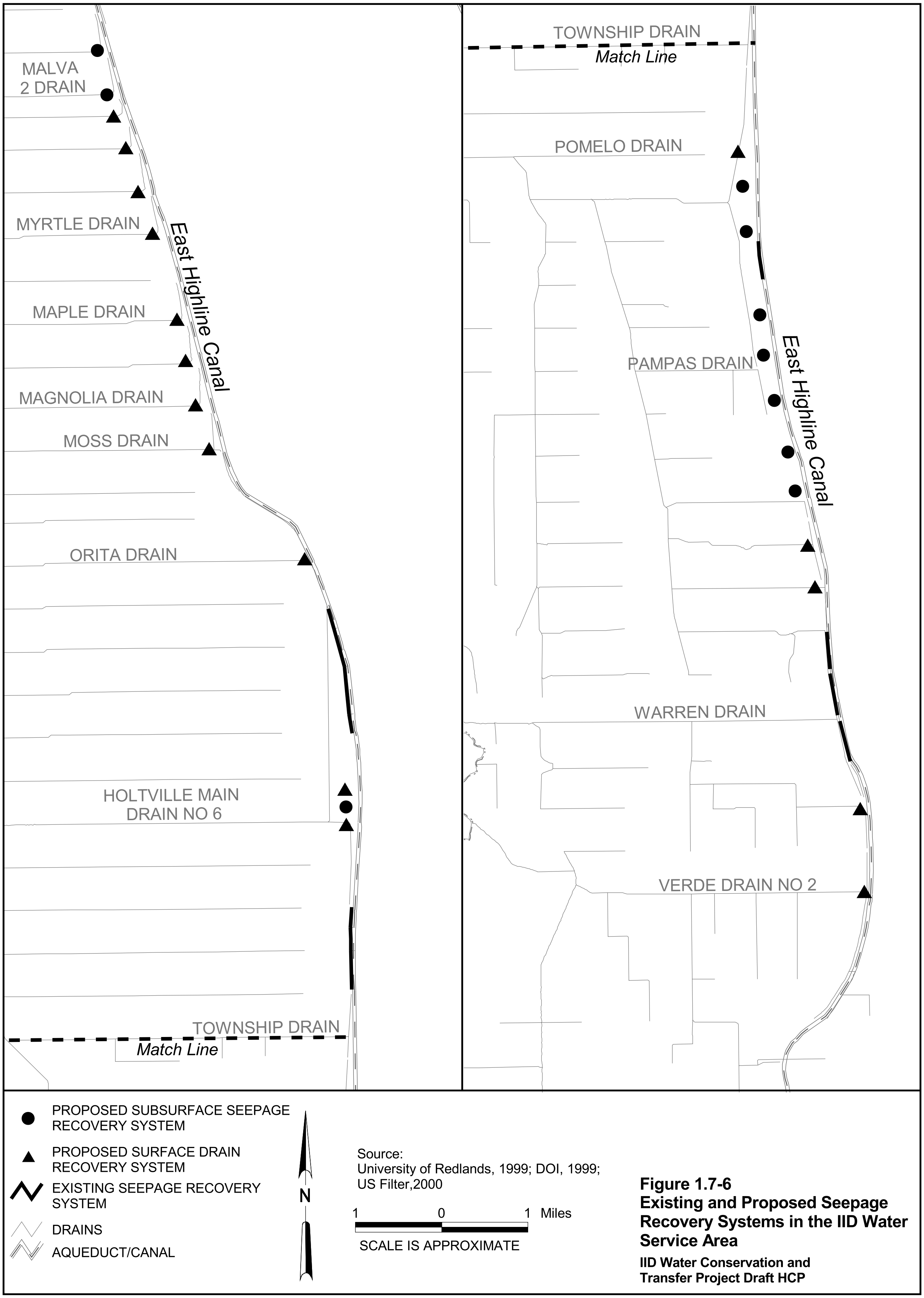
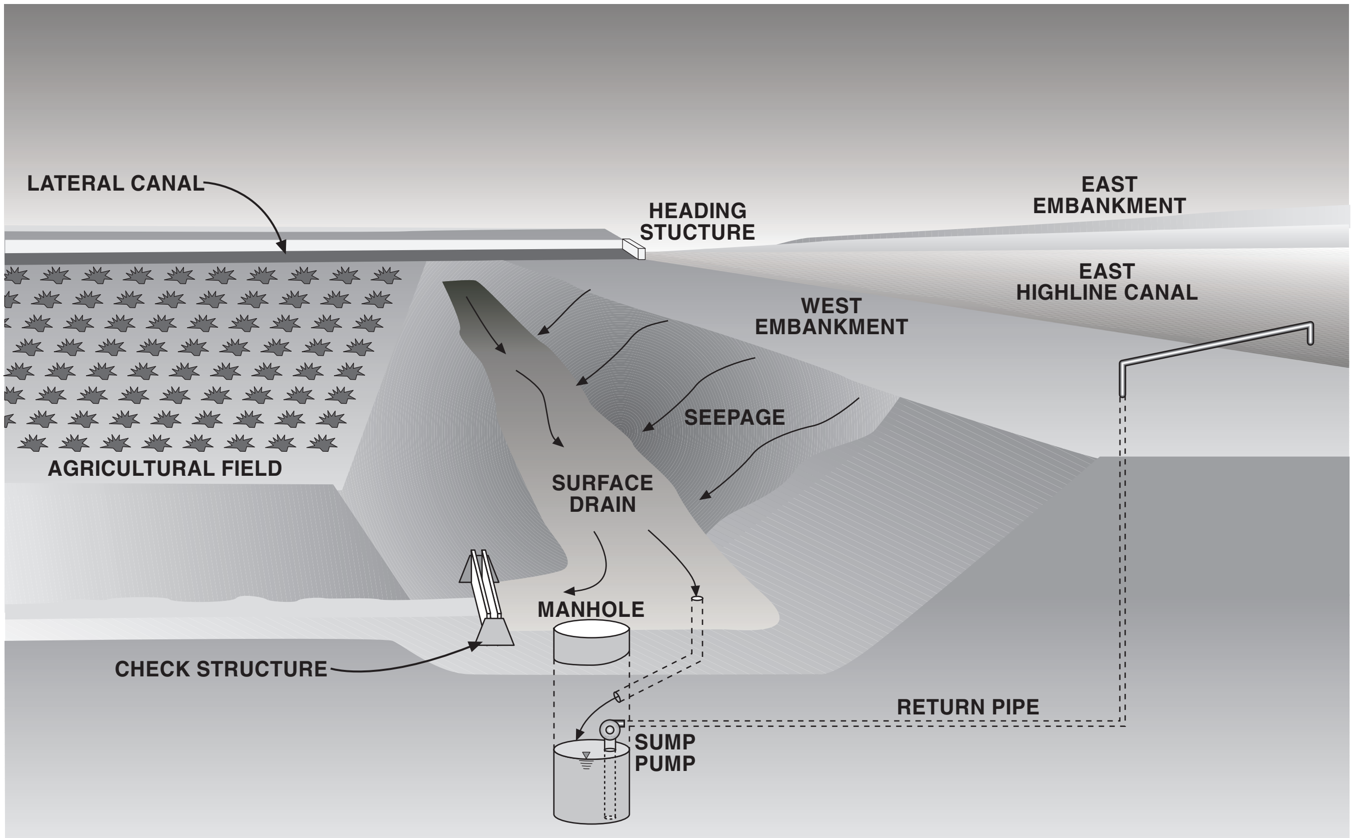
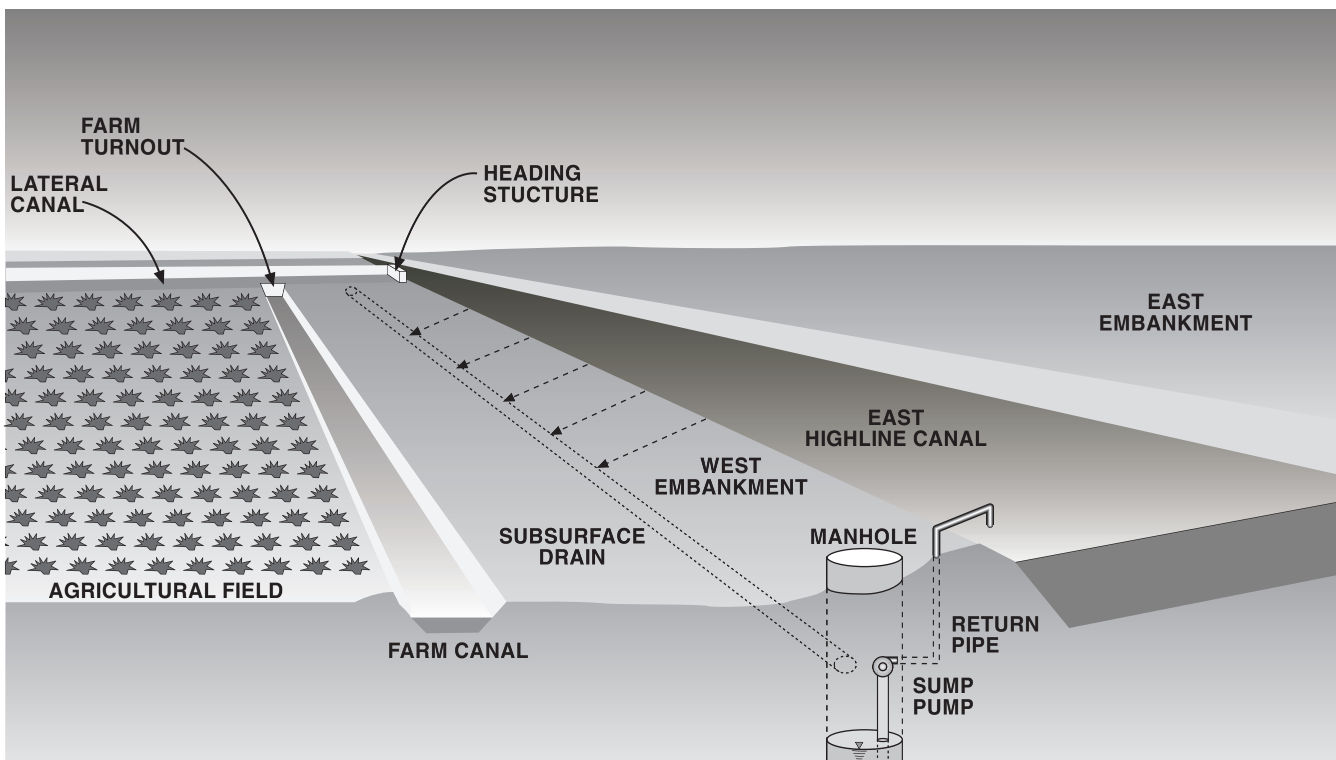


Figure 1.7-6
Existing and Proposed Seepage Recovery Systems in the IID Water Service Area

IID Water Conservation and Transfer Project Draft HCP



SURFACE DRAIN RECOVERY SYSTEM



SUBSURFACE DRAIN RECOVERY SYSTEM

FIGURE 1.7-7
CONCEPTUAL SEEPAGE RECOVERY SYSTEMS
IID WATER CONSERVATION AND TRANSFER PROJECT DRAFT HCP

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TABLE 1.7-4
Proposed Seepage Collectors and Acreage Potentially Affected by Construction

Seepage Collector	Type	Length (miles)	Acreage Affected
EHL 14	Surface	0.19	<0.1
Holtville No.3	Surface	0.59	<0.1
Holtville No.6	Surface	0.51	<0.1
Holtville Main	Surface	0.55	<0.1
Magnolia	Surface	0.42	<0.1
Malva	Surface	0.19	<0.1
Maple	Surface	0.35	<0.1
Mesquite	Surface	0.42	<0.1
Moss	Surface	0.42	<0.1
Mulberry	Surface	0.26	<0.1
Munyon	Surface	0.42	<0.1
Myrtle	Surface	0.37	<0.1
Orita	Surface	0.42	<0.1
Oxalis Lateral	Surface	1.19	<0.1
Verde No.2 & 2-D	Surface	1.58	<0.1
Warren No.2	Surface	0.44	<0.1
Total Open Systems		**8.3**	**<1.6**
EHL 16 Lateral	Subsurface	0.48	4.1
Malva 2	Subsurface	0.48	4.1
Mayflower	Subsurface	0.48	4.1
Orchid	Subsurface	0.48	4.1
Palm	Subsurface	0.48	4.1
Pampas	Subsurface	0.48	4.1
Peach	Subsurface	0.48	4.1
Plum	Subsurface	0.48	4.1
Pomelo	Subsurface	0.48	4.1
Rositas Canal	Subsurface	0.48	4.1
Total Subsurface Systems		**4.8**	**41.0**
Total All Systems		**13.2**	**42.6**

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1.7.3.1 Conveyance System Operation

Covered activities associated with the operation of the conveyance system encompass the following:

- Conveyance, measurement, and delivery of water through the entire AAC system beginning where water is diverted at Imperial Dam on the LCR to the Westside Main Canal turnout, located at the southwestern corner of the Imperial Valley
- Conveyance, measurement, and delivery of water to customers through the main and lateral canal system within the IID service area
- Canal operational activities involving the filling, draining, and movement of water through the canal system to accommodate maintenance and customer needs

IID delivers Colorado River water to lands within the Imperial Valley for agricultural, domestic, industrial, and other beneficial uses. Water is diverted from the Colorado River at Imperial Dam and is conveyed by gravity flow to Imperial Valley via the 82-mile-long AAC (Figure 1.7-1). The Coachella Canal branches off from the AAC about 37 miles west of Imperial Dam. The O&M activities associated with the Coachella Canal, which is operated by CVWD, are not covered by this HCP.

Three primary main canals (i.e., East Highline, Central Main, and Westside Main) branch off the AAC as it moves across the southern portion of the Imperial Valley. These main canals are owned and operated by IID and supply water to numerous lateral canals located throughout the irrigated service area of IID. The lateral canals carry water from the main canals to farm fields; turnouts are used on the canals and laterals to deliver water to individual farm fields. Canal segments may be dewatered between irrigation deliveries for maintenance purposes or to reduce moss and algal growth, which interferes with water deliveries.

In total, IID operates and maintains 1,667 miles of canals to deliver water to irrigated farmland in the Imperial Valley. Of the 1,667 miles of canals, 1,114 miles are concrete-lined, about 537 miles are unlined earthen canals, and the remaining 16 miles of the conveyance system are pipelined (cited from IID's Memorandum dated October 4, 2000) (Figure 1.7-8). IID currently does not anticipate constructing any new canals. However, occasionally a portion of a canal needs to be rerouted. On average, 0.25 miles of canal may be rerouted annually. Construction required to reroute a canal is the same as that required to install a lateral interceptor canal. Thus, about 2 acres could be disturbed each year to reroute canals for a total of 150 acres over the term of the permit.

1.7.3.2 Drainage System Operation

Covered activities associated with the operation of the drainage system include collection, conveyance, measurement, and discharge of drainage water through IID's main and lateral drain system to the rivers and the Salton Sea; and drain operational activities associated with the filling, draining, and movement of drain water through the main and lateral drain system to accommodate maintenance and customer needs.

IID is obliged, as stated in its rules and regulations covering drainage, to provide a drain outlet for every 160 acres of farmland within its service area. To do so, IID operates a

Figure 1.7-8
IID Conveyance System
IID Water Conservation and Transfer Project Draft HCP

complex drainage system within its service area consisting of 1,456 miles (cited from IID's Memorandum dated October 4, 2000) of open and closed (pipeline) drains and associated features, surface and subsurface drainage pumps, subsurface drains and associated collection pipelines, and water recovery systems. The IID drainage system is shown in Figure 1.7-8. Like the canal system, the drain system is composed of main and lateral drains.

Periodically, IID reroutes and constructs new drains. On average, about 2 miles of drains are rerouted or constructed within a 10-year period. Construction of a new drain entails trenching to a depth of about 7 feet and creating the roadways adjacent to the drain. The new drain and associated roadways fill the right-of-way for the drain. The right-of-way on lateral drains is 80 feet and on main drains is 120 feet. Drains to be rerouted or constructed primarily would be lateral drains. Construction of 2 miles of lateral drains would result in ground disturbance encompassing about 10 acres over a 10-year period. If the newly constructed drains were main drains, about 15 acres would be disturbed over a 10-year period. From 75 to 112 acres could be disturbed over the 75 year permit term.

On-farm irrigation water that percolates through the soil is collected by subsurface tile drains and, to a lesser extent, by surface drains. The open drains (mostly the lateral drains) collect tailwater and tilewater from area farms as well as operational discharge water emanating from IID's delivery system. Tailwater is irrigation water that runs off the lower end of the fields and is discharged into the drains. Tilewater is subsurface drainage water generated primarily through leaching operations performed by farmers. Currently, more than 35,000 miles of subsurface drainage tile have been installed by Imperial Valley farmers. Outlets for drainage tile into drains can occur at intervals as close as 660 feet, but are generally at quarter- to half-mile intervals, or tilewater is collected in sumps from which it is pumped to the nearest outlet, which is a drain, a river, or the Salton Sea. IID estimates that there are in excess of 14,000 outlets of tile drains into the IID drainage system from its customers. Most drain water discharges are into IID's surface drain system, although some discharge directly to the New or Alamo Rivers or the Salton Sea.

1.7.3.3 Maintenance Activities

Maintenance activities required for the conveyance and drainage systems include keeping existing irrigation, drainage, and related facilities in good repair and working condition, so that all parts of these facilities can fulfill the intended purpose for which they were originally designed. Minor improvements undertaken during the normal process of performing these activities also are included. Covered maintenance activities include the following activities relating to the irrigation and drainage system and associated facilities:

- Inspection activities
- Canal maintenance
- Right-of-way maintenance
- Seepage maintenance
- Structure maintenance
- Pipeline maintenance
- Reservoir maintenance
- Sediment removal from canals and drains
- Operation and maintenance of the desilting basins
- Mechanical, chemical, and biological weed control maintenance

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- New and Alamo River maintenance
- Salton Sea dike maintenance
- Gravel and rock quarrying

Each of these activities is described below.

Inspection Activities

IID continuously inspects its canal and drainage system from access roads adjacent to the facilities to determine where and when maintenance is required.

Canal Maintenance

About 1,114 miles of the IID's conveyance system consist of concrete-lined channels. Concrete-lined canals, including the AAC when lined in the future, require periodic inspection and repair. The concrete-lined canals are segmented with contraction joints to resemble a series of concrete panels. The joints between the panels often are sealed with tar or another waterproof mastic. Repair consists of periodic concrete panel replacement or resealing joints. To replace concrete panels, the existing panels are removed and new concrete poured to create the panels. All activities are restricted to IID's right-of-way on the canal.

Portions of the concrete lining are replaced on an as needed basis. Thus, the frequency, magnitude, and location of this activity are highly variable. To replace or repair canal lining, the canal must be dewatered. IID attempts to dewater each canal every 2 months for about 3 days. However, on average, canals are typically dewatered every 3 to 4 months. Canal lining and repair are conducted during these periods. The amount of canal lining can vary from one or two panels covering several feet to one-half mile. IID anticipates that the concrete lining on currently lined canals will require replacement up to two times over the next 75 years.

Along the AAC, IID maintains and operates three existing seepage recovery systems. Two of these systems are located at Drop 4 and one is at Drop 3. The seepage recovery systems at Drop 4 are pumped, while the system at Drop 3 is a gravity system. About every 10 years, IID needs to clean vegetation out of these systems.

The preferred alternative for the AAC Lining Project is to construct a new canal parallel to the existing AAC from one mile west of Pilot Knob to Drop 3 (Reclamation and IID 1994). When completed, IID will operate and maintain the new canal section in the same manner as the existing canal. In the EIS/EIR for the AAC Lining Project, it was assumed that the old canal section would be retained and maintained for emergency use. The specific operation and maintenance activities required to maintain the canal for emergency use will be developed during project design. The Biological Opinion for the AAC Lining Project describes expected management of the abandoned section as follows.

> *"The abandoned sections of the existing canal would be managed by IID as an emergency channel in the event of damage to the parallel canal or other catastrophic event. To accomplish this, a management plan for the old canal would be prepared during the project design phase in coordination with the BLM and other agencies. The plan would include the specific action needed to maintain the abandoned sections for the specified purpose of an emergency use channel. The plan would include actions needed to keep the abandoned canal prism and*

> *maintenance roads free of vegetation. Vegetation control may involve regular disking and the use of legally approved chemical herbicides."*

The HCP covers management of the abandoned section in a manner consistent with the management assumed in the EIS/EIR and Biological Opinion for the AAC Lining Project.

Right-of-Way Maintenance

Canals are generally constructed on a 50- to 70-foot-wide rights-of-way, while the right-of-way for drains is generally 80 to 120 feet wide, depending on whether it is a main or lateral facility. The rights-of-way for canals and drains consist of the drain or canal, roadways on both sides of the channel and the associated embankments. The right-of-way on piped sections of the conveyance and drainage systems are typically narrower, about 40 feet. Conveyance pipelines are used through developed areas and are typically covered by roads, parks, and other uses consisting of open space facilities. The rights-of-way of drainage pipelines are typically farmed.

Right-of-way maintenance involves maintaining the canal, drain, and siphons associated with the right-of-way clear of deep-rooted vegetation, debris, and trash, and maintaining the accessibility to facilities and the use of the roadways associated with the channels. This maintenance refers to that portion of the right-of-way outside the canal or drain prism; canal and drain maintenance within the prism is addressed separately. Right-of-way maintenance encompasses maintaining the roads and associated embankments in good repair and controlling vegetation. Vegetation control is described in more detail below. Debris and trash in the canals and drains are removed as needed.

The embankments of drains and canals require periodic maintenance. During sediment removal activities, silt is removed and deposited on the adjacent embankment and roadway. The embankments and associated roadways are later graded and groomed to blend the material into the embankment for the purpose of maintaining a surface that can accommodate vehicle traffic and equipment access. Grading also smoothes the embankment surface and removes rills that develop during rain storms, thus reducing the potential for erosion. IID maintains and operates five graders for maintaining embankments. The graders operate every day except when it rains and each grader can cover 3 miles per day. Thus, about 15 miles can be graded per day. Drain embankments are graded and groomed in association with drain maintenance activities that occur once every 5 years on average. The embankments of the main canals (e.g., East Highline, Westside Main, Central Main, and the AAC) are typically graded and groomed several times a year. The remaining canal embankments are graded and groomed once a year on average.

Other embankment maintenance activities include regular watering of the banks and roadways along the AAC, main and lateral canals, and drains with a water truck to minimize dust generation. Several segments of the main canals, including the AAC, are surrounded by chain link fencing. This fencing requires periodic repair and replacement and is considered part of right-of-way maintenance.

To maintain the canal and drain embankments, both within and outside the canal and drain prism, erosion problems need to be corrected. Erosion maintenance on the outside of the canal or drain occurs infrequently. Damage to the embankments from erosion is generally corrected during the embankment maintenance activities described above. Occasional intense storms can cause localized areas of erosion requiring immediate corrective actions;

these are addressed as part of the emergency response activities. Erosion maintenance activities are limited to the rights-of-way of the canals or drains.

Along the portion of the AAC that traverses the Algodones Dunes, IID annually knocks down portions of the sand dunes, creating a flatter slope that allows sand to blow across the canal. In conducting this flattening, a dozer drags an I-beam back and forth across the peaks of the dunes to level them. The area where this activity is conducted begins at the Coachella Turnout (Sta. 1907+20) and extends to about Sidewinder Road at Pilot Knob (Sta. 1243+65), a distance of 12.56 miles. The area actually disturbed is about 50 to 75 feet wide yielding a total acreage disturbed of 76 to 114 acres. This operation begins in July every year and lasts about 6 weeks. In conjunction with flattening the dunes, the roadways along the AAC are cleared of accumulated sand. After the roads are opened up, they are immediately treated with herbicides for vegetation control. IID has been conducting these activities since the construction of the AAC in about 1945.

Erosion also can occur within drains or unlined canals. The erosion results from meandering channels of water from irrigation flow or drain water or stormwater runoff. Vegetation or sandbars can cause a change in water direction within a canal or drain and an associated erosion problem if not corrected by removal. Regular drain and canal maintenance activities (i.e., sediment removal and vegetation control) minimize the occurrence of erosion problems, and most erosion problems are corrected during regular maintenance. However, storm waters can result in embankment damage or loss that may necessitate the hauling and placement of fill material. This condition is addressed as part of the emergency response activities.

Right-of-way maintenance also consists of activities required for the maintenance and operation of power transmission facilities within the HCP area. These activities include regular inspection of facilities, clearing the power line rights-of-way, and repairing and replacing equipment as necessary. The power system within the HCP area is composed of nearly 3,000 miles of distribution and transmission lines and about 50 substations. The transmission and distribution lines exist in canal and drain rights-of-way and right-of-way maintenance for the drains and canals covers right-of-way maintenance for the transmission lines.

Additional transmission lines could be developed as a result of efforts to implement water conservation measures. For example, tailwater pumpback facilities constructed by individual farmers could encourage the extension of power transmission lines to operate the pumps. Currently, tailwater pumps typically are operated by diesel engines. IID anticipates that the relatively high cost associated with extending transmission lines will continue to discourage this practice in the Imperial Valley and that the installation of transmission lines to serve pumpback facilities will be infrequent. Further, any extension of transmission lines likely will occur in farmland along existing canal or drain rights-of-way.

Seepage Maintenance

Gophers or vegetation can cause leaks in the canal banks, although this occurs infrequently. Leaks also can be caused by earthquakes or seal breakage on a canal from cleaning. Activities to correct seepage problems are similar in each case. The embankment is cored, clay is mixed with the existing material, and the mixture is re-compacted. Seepage maintenance activities are focused on unlined canals and limited to the canal's right-of-way.

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On average, seepage maintenance activities are conducted on 5 to 10 miles of canal a year. Over the term of the permit, seepage maintenance activities could be conducted on all of the unlined canals (537 miles) at least once.

Structure Maintenance

In addition to the canals, about 20,000 structures within the canals and drains are required to convey water throughout the IID service area. These structures include, but are not limited to, delivery gates, checks, headings, turnouts, moss pipes, weep pipes, drainage sumps, irrigation pumps, numerous types of bridges, lifting devices, and flow measurement devices. O&M activities required for these structures include inspection, adjustments, and periodic or emergency repairs and replacement. IID estimates that about 200 structures need to be replaced each year, but historically fewer structures have been replaced. In the future, 300 structures could require replacement each year as the infrastructure ages. Activities associated with the repair and replacement of structures are conducted within the rights-of-way. Ground disturbance to replace structures on laterals is generally limited to a 75-by-75-foot area. On main canals, any ground disturbance generally occurs within a 150-by-150-foot area. If all of the structures are replaced during the term of the permit up to 2,970 acres could be temporarily disturbed.

There are 25 sites in and around cities and towns in the Imperial Valley that currently have trash screens on irrigation and drainage channel facilities. The screens typically exist at road siphons and pipeline entrances. The purpose of the screens is primarily for safety, but they also result in an accumulation of trash. These trash screens require frequent cleaning of debris to prevent water backup and inundation of tile lines in drains and possible minor flooding on adjacent properties where canals are involved.

Pipeline Maintenance

Portions of the conveyance (Figure 1.7-8) and drainage systems are contained in pipelines. Maintenance activities consist of maintaining the pipeline right-of-way and around the manholes that provide access to the pipelines clear of deep-rooted vegetation. Vegetation also is maintained at a height that allows visual access. Drain pipelines primarily occur in farm fields while conveyance system pipelines occur through developed areas. Thus, little vegetation control is necessary. In addition, the pipelines are periodically inspected, repaired, and replaced as necessary. Any activities are generally limited to the 40-foot-wide right-of-way of the pipeline. It is anticipated that all pipelines will be replaced once during the 75-year permit term.

Reservoir Maintenance

The IID conveyance system contains 10 regulating reservoirs (Figure 1.7-8). Regulating reservoirs capture spills from a water delivery/conveyance facility and are used to match delivery flows with demand flows. The same types of maintenance activities required for canals are conducted at reservoirs. Vegetation is controlled around the reservoir using chemical methods. Infrequently riprap needs to be replaced or amended to maintain the structural integrity of the embankments. Also, the concrete lining of the reservoirs occasionally but infrequently requires repair or replacement. The reservoir embankments are graded, groomed, and stabilized, as necessary in the same manner as described under Right-of-Way Maintenance. Embankment maintenance along reservoirs occurs about once every 5 years. On very rare occasions (e.g., once every 25 years), a reservoir may be drained and the sediment removed. Sediment from the reservoir is deposited and graded along

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canals. Chain link fencing surrounds the reservoirs and requires periodic repair and replacement. Automated reservoirs with control houses require frequent visitation by maintenance personnel to ensure proper operation.

Sediment Removal from Canals and Drains

The greatest single maintenance expense for IID is the removal of sediment from its canal and drainage systems, with the drainage system receiving the most attention. This is a mechanical process that requires the use of hydraulic excavators or small backhoes to remove the material. Dredged spoil is deposited along the side of the canal or drain, where it is allowed to dry before being groomed into the embankment by a dozer or grader. Drains are cleaned on an as-needed basis, depending on the extent of vegetative growth or sediment accumulation. Drains with the flattest bottom slope accumulate sediment most rapidly, and may require cleaning annually. Other drain segments may not require cleaning for periods of 10 years or more. On average, IID cleans approximately 300 miles of drains annually, but the amount varies from year to year. The drain embankments and road surface along the drain are re-contoured, graded, and groomed in association with drain cleaning or in emergency situations (e.g., bank sloughing during a storm) as described under Right-of-Way Maintenance.

Operation and Maintenance of the Desilting Basins

Colorado River water diverted at Imperial Dam immediately passes into one of three desilting basins used to remove silt and to clarify the water. Each of the desilting basins is 540 feet wide by 770 feet long and is equipped with 72 scrapers designed to remove 70,000 tons of silt per day. Silt removed at the facility is returned to the Colorado River downstream of Imperial Dam. Periodic maintenance of desilting basins requires dewatering of individual basins to performed repairs and routine maintenance.

Weed Control Maintenance

As noted above, maintenance of the canals, drains and various structures typically involves vegetation control. IID uses mechanical, chemical, and biological methods to control vegetation. To a lesser extent, IID occasionally uses controlled burning as a means to improve visibility of the drain channel during drain maintenance, improve the performance of herbicides, and to remove accumulations of dried plant material that impede the flow of water through the drain. These methods and their application to IID’s facilities are described below.

Mechanical methods of vegetation control are used in canals. Canals accumulate moss and algae that must be removed periodically because it impedes water flow within the channel and at structures. In concrete-lined canal sections, moss carts and chains are pulled along the canal to remove algae and moss that develop on the bottom and sides of the canal. A backhoe follows and removes the vegetation collected by the moss cart. Moss carts are used for concrete-lined laterals while chaining is used to clear moss and algae from main canals and unlined lateral canals. If very thick moss and algae has developed in unlined canals, disking may be necessary to remove the vegetation. Use of a moss cart requires dewatering the canal. Thus, vegetation removal with a moss cart occurs in conjunction with the regular dewatering for most canals. Chaining does not require dewatering. Vegetation is removed from all canals at least once a year. However, about 10 to 15 percent of the canals accumulate large amounts of moss and algae and require cleaning as frequently as every two weeks.

Mechanical and chemical methods are used to control vegetation in the drain and canal rights-of-way and around IID's other facilities such as hydroelectric facilities, drop structures on the New and Alamo rivers. Chaining, discoing, and side scraping (moss cart) are used to control vegetation on embankments and around other facilities. An excavator is used to remove vegetation from the drains. Vegetation removal in the drains occurs in association with sediment removal activities described above. In removing vegetation from the drains, an excavator is operated from the top of the bank where it is used to scrape vegetation from the side and bottom of the channel. Along drains, extensive vegetation can develop on top of the drain banks and access roads, requiring a bulldozer to grade and gain access to the drain prior to maintenance.

Biological control methods are used for aquatic weeds, such as hydrilla, sago pondweed, and Eurasian watermilfoil. Grass carp feed on these plants and triploid sterile grass carp are raised at IID hatchery facilities and stocked in the canals for the purpose of controlling aquatic vegetation. The use of grass carp reduces the frequency of the other control methods. Fish hatchery O&M activities are described in Section 1.7.4.1, Fish Hatchery Operations and Maintenance.

Chemical methods also are used to control vegetation in the drains, canals, and on the drain and canal banks. Take of covered species from changes in the amount or composition of vegetation resulting from herbicide use is covered by this HCP, but any take of covered species resulting from toxicological effects of herbicide use is not covered by this HCP. Chemical control methods are carried out by third parties under contract with the District and by its own staff. On a monthly basis, the District's Pest Control Advisor instructs the contractor on where to conduct control activities and advises on the chemicals to use. Within the general area identified by the District's Pest Control Advisor, the applicator has the discretion to decide where to work, which is generally influenced by the extent of weed growth and local wind conditions.

The chemicals currently used to control vegetation are Roundup®, Direx®, and Rodeo®. Rodeo® is applied where contact with water may occur; Direx® is used for woody plants, particularly salt cedar. Direx® is not used in applications where contact with water could occur. Chemical control of vegetation on the banks of the canal is supplemented with mechanical removal, as necessary. Vegetation is sprayed during March through August, and occasionally into September. All herbicide applications are carried out under a permit from the Imperial County Agricultural Commissioner and are subject to its conditions. The chemicals are applied in accordance with label instructions. About 565 miles of outer drain embankments are sprayed with a mixture of Roundup® and Direx® a year. About 1,430 miles of the outside banks of canals and drains are treated with Roundup® a year and about 980 miles of canals and drains are treated with Rodeo®. Rodeo® is the only chemical control used on drains and canals on the state and federal refuges.

In addition to the weed control measures described, IID occasionally uses controlled burning as a method for controlling unwanted vegetation in the drains. Drain burning, which has been used on a limited basis by IID since the turn of the century, is performed to improve visibility of the drain channel, improve the effectiveness of herbicides, and to remove accumulations of plant material from the drains. IID obtains an annual burn permit from the Agricultural Commissioner and only burns on designated burn days.

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During the mechanical removal of sediment, it is necessary for excavator operators to have visual contact with the bottom of the drain. Visual contact allows the operator to avoid excavations that remove too little or too much material from the drain. Under excavations (removal of too little sediment) are corrected by conducting an additional sweep of the excavator arm and removing more material from the site. This results in a duplication of effort and contributes to inefficient use of labor and equipment time. Over excavations (removal of too much sediment) result in a series of deep and shallow areas within the flow path of the drain. These undulations in the channel create disruptions in the flow that create or accelerate erosion processes within the channel. The uneven channel bed and disrupted flow encourages the channel to meander, which contributes to drain bank erosion. In addition, poor visibility increases the potential for the operator to inadvertently pull material directly from the banks. This results in a long-term instability of the channel and can cause erosion and bank failure problems that can take years to correct in some drains.

Controlled burning in the drains also is used to improve the effectiveness of herbicide applications. Tall, old, and established vegetation requires a heavier single application of herbicide or a greater number of lighter applications than young vegetation to achieve the desired level of control. Controlled burning in the drain removes decadent vegetation and encourages sprouting and regrowth. Herbicides applied on the young growth are assimilated into the plant more effectively and provide better control at lower application rates.

In addition to improving visibility and increasing the performance of herbicides, IID uses controlled burning in certain circumstances to remove accumulations of dried plant material that impede the flow of drain water. This practice occurs primarily in dense stands of *Phragmites* where plants on the drain bank collapse and accumulate in the channel.

IID uses controlled burning as a drain vegetation control practice on a limited basis and only under conditions where alternative techniques are not as effective. Currently, IID uses controlled burning on approximately 0.5 to 1.0 miles of drains per year (up to 75 miles over the term of the permit).

New and Alamo River Maintenance

In addition to the constructed drain system, the New and Alamo Rivers carry drain water to the Salton Sea. The District has no legal authority to regulate activities in these rivers. To control erosion of the river, the District constructed and maintains 20 drop structures on the rivers most of which are on the Alamo River. Maintenance activities for the drop structures consist of weed control on the banks around the structures. Mechanical and chemical control methods are used to treat about 0.5 acres every year (0.25 acre on each bank), affecting 10 acres a year. IID also conducts bank protection measures as necessary along the rivers. Bank protection activities focus on specific bank failures or areas of erosion. Typically an area about 100 feet wide and 500 feet long (i.e., about 1 acre) is disturbed in conducting bank protection activities.

IID periodically dredges the New and Alamo River channels from the United States Geological Survey gaging stations on each river to the rivers' outlets at the Salton Sea. Six to eight feet of dredge material typically are removed from the river channel during this operation. The dredge spoils are pushed into deeper water in the Salton Sea creating a submerged river channel. Through this process, the channels of the New and Alamo Rivers have been extended about 1.75 and 2.5 miles into the Salton Sea, respectively. By moving the

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spoils into increasingly deeper water in the Salton Sea, the rate at which the channel fills with sediment and requires dredging is reduced. IID retains the vegetation on the riverbanks to minimize erosion; however, it is necessary to lay the vegetation (mostly *Phragmites*) over on the banks with the dredging equipment in order to gain access. Dredging of the rivers' mouths occurs about once every four years. More frequently, areas around the gaging stations on the rivers are dredged. The area dredged extends from about 200 feet upstream of the gage to about 500 feet downstream of the gage. This dredging occurs about every two years on the New River and annually on the Alamo River. This dredging is currently conducted in the late summer or fall to avoid impacts to Yuma clapper rails.

Salton Sea Dike Maintenance

IID maintains about 20 miles of dikes along portions of the southern end of the Salton Sea to prevent inundation of lands as the Salton Sea rose. Most of the maintenance required for the dikes consists of pulling riprap that has shifted down back into place on the dike bank. This activity is conducted along the dikes at least once a year and sometimes three or four times a year in certain locations. Other maintenance activities include repairing sections damaged in storms, filling in and replacing riprap, and grading and grooming the embankments and road surfaces on the embankments. These activities are either conducted from the road surface along the dike or from the water immediately adjacent to the dike.

Gravel and Rock Quarrying

IID owns and operates two small rock and gravel mining operations to support its maintenance activities. The two quarries, Red Hill and Pumice Island, are located on the south shore of the Salton Sea. The quarries are barren and do not support vegetation. Each quarry occupies approximately 160 acres and was acquired by IID in the late 1930s from the Southern Pacific Railroad Company. They have been operated as quarries since that time. IID quarries rock and gravel from these areas on an as-needed basis for riprap and road construction and surfacing throughout IID's service area as part of maintenance and for emergency repairs.

1.7.4 Miscellaneous IID Activities

IID also conducts activities that do not fall within the categories previously described. These activities include the following:

- Fish hatchery O&M
- Recreational facilities
- Use of IID land
- Hydroelectric power generation facilities
- Emergency response activities
- HCP and project EIR/EIS mitigation measures

1.7.4.1 Fish Hatchery Operations and Maintenance

As described earlier, grass carp are stocked in the canal and drain systems to control aquatic weeds. The District operates a hatchery in El Centro and grow-out facilities in Niland to produce grass carp. On average the hatchery produces 20,000 stockable grass carp per year. As of January 1998, more than 200,000 fish had been stocked into the canal system. The District's goal is to stock 20,000 to 25,000 fish a year.

The hatchery operates under a Memorandum of Understanding (MOU) with the California Department of Fish and Game (CDFG). Under this MOU, the hatchery must meet specific requirements, including maintaining a security chain linked fence around the facilities, maintaining high/low water level alarms, and maintaining bird netting over the ponds and filtering of discharge water to minimize the potential for fish to escape. The MOU also prohibits stocking of grass carp in drains that support desert pupfish because of the potential for introducing parasites or diseases, direct competition, and interference behavior.

O&M activities include cleaning and disinfecting the ponds and pipelines, controlling weed growth around the ponds, flushing the ponds and pipelines, spawning the fish, transporting fry to grow-out ponds, and rearing and stocking the fish. Sterile triploid grass carp are produced for release to prevent establishment of a breeding population in the canals. Before release, every fish produced is given a blood test to confirm that it is triploid, and therefore sterile. Diploid grass carp, which are fertile, are destroyed after spawning.

1.7.4.2 Recreational Facilities

Five of the 10 regulating reservoirs and the canal system within IID's service area are open to recreational use. Fishing and bird watching are the primary recreational uses supported by the reservoirs. IID does not conduct any activities specifically to support recreation at the reservoirs and canals.

The District owns and maintains recreational facilities at Fig Lagoon, an approximately 80-acre pond created by IID. Maintenance activities at Fig Lagoon include dredging at the mouth of the drain inlet to the lagoon from Fig Drain. About every 60 days an area 30 feet wide, 4 feet deep and 600 feet long is dredged to maintain water flow from Fig Drain into the lagoon. Developed facilities at Fig Lagoon currently consist of several picnic tables, an information kiosk, and a latrine. The area is used for fishing, bird watching, and picnicking.

In addition to Fig Lagoon, IID owns and operates three recreational vehicle (RV) parks at Salton Sea Beach, Corvina Beach, and Bombay Beach. IID dredges at these RV parks about every 60 days to maintain boat access to the Salton Sea. IID also conducts dredging at the Red Hill Marina on request although the District does not own the marina. IID dredges at Red Hill Marina about every other year.

No additional recreational facilities are planned at this time, but could be pursued by IID during the permit term. Any additional recreational facilities developed by IID and covered by this HCP would be restricted to features developed to support fishing, wildlife viewing, picnicking, walking/jogging, bicycling and related activities at IID facilities. New recreational facilities covered by this HCP would consist of small scale features such as:

- Picnic tables
- Bike paths
- Walking/jogging paths
- Restrooms
- Information kiosks

Recreational facilities would be associated with IID's water conveyance and drainage facilities and would be located within the rights-of-way of these facilities. Construction of recreational facilities is a covered activity under this HCP, but take that could result from use of the facilities by third parties is not covered.

1.7.4.3 Use of IID Land by Lessees

The IID currently owns approximately 118,000 acres of land within the HCP/Salton Sea area. Approximately 6,600 acres are located in the irrigated portion of the service area and are not contiguous to the Salton Sea. The Salton Sea currently inundates about 105,000 acres and another 6,100 acres are contiguous to and surround the Salton Sea. IID leases its farmable lands to farmers engaged in the production of agricultural products and to federal and state wildlife agencies for wildlife management. IID seeks coverage under this HCP for whatever incidental take may be attributed to it as the lessor of the land. IID is not seeking coverage for activities conducted by lessees on IID land, except those activities directly related to the water conservation program described elsewhere in this HCP.

The acreages of land leased for these uses are shown in Table 1.7-5.

1.7.4.4 Use of IID Land by IID

For the term of the permit, IID may convert land that it owns to a new use. Except for land currently leased to the USFWS for management as wildlife habitat, any incidental take of covered species resulting from changed land uses or land management activities will be covered as long as the new use is a covered activity. Land uses that constitute covered activities are:

TABLE 1.7-5
Types of Leases and Approximate Acreages of Lands Leased by IID to Third Parties in the HCP Area

Type of Lease	Approximate Acreage
Agricultural	1,167
Recreational areas/facilities	7,278
Duck club	371
Wildlife management	4,857
Geothermal[a]	29,325
Archeological excavation	100
Telecommunication facilities	8 facilities
Other (e.g., storage sites, plants, dumps)	1,347

[a] Subsurface lease

- Installation and implementation of water conservation measures, including fallowing
- Installation and operation of conveyance and drainage facilities
- Creation and management of fish or wildlife habitat
- Construction and operation of a fish hatchery
- Implementation of any other environmental mitigation associated with the IID Water Conservation and Transfer project, this HCP, or the QSA

Incidental take of covered species that could result if IID land that is currently leased to the USFWS for management as wildlife habitat is converted to another land use is not covered by this HCP.

1.7.4.5 Hydroelectric Power Generation Facilities

IID operates eight hydroelectric generation facilities on the canal system. Six of these facilities are located on the AAC, one on the Westside Main Canal, and one on the East Highline Canal (Figure 1.7-1). These hydroelectric generation facilities are situated on the canals and occupy a relatively small area. Maintenance activities include vegetation control on the facility grounds, removing debris from the trash racks upstream of the facilities, and occasional stabilization of the canal banks immediately downstream of the facilities.

1.7.4.6 Emergency Response

Emergency activities are actions that IID must take immediately and unpredictably to repair or prevent damage to its facilities in order to prevent property damage or protect human health and safety. Emergencies are situations under which IID cannot follow the normal procedures detailed under each of the conservation strategies (Chapter 3) to correct or prevent damage to property or risk to human health or safety. Emergency activities are most frequently required to respond to storm events or natural disaster (e.g., earthquakes) that result in damage to IID facilities (e.g., canal wash out, plugged siphon) and interrupt the distribution or collection of water. Actions required by IID in emergency situations will vary depending on the specific circumstances but typically include removing debris, hauling fill material, removing sediment, moving large amounts of earth, dewatering a canal section, repairing embankments, replacing/repairing damaged structures, and replacing rip rap.

1.7.4.7 HCP and Environmental Mitigation Measures

Any incidental take of covered species that results from activities associated with the implementation of the mitigation measures and monitoring program associated with the HCP, the EIR/EIS for the IID Water Conservation and Transfer project, the Program EIR for the QSA, and any other environmental assessment related to the covered activities are covered under this HCP. These covered activities include management of habitat that is restored, created or acquired in implementing the HCP as well as monitoring activities as described in Chapter 3: Habitat Conservation Plan Components and Effects on Covered Species and Chapter 4: Monitoring and Adaptive Management. Mitigation, management and monitoring activities implemented by qualified third parties on behalf of IID for these purposes also are covered.

1.8 Regulatory Context

1.8.1 Federal Endangered Species Act

The FESA, as amended, is administered by the Secretaries of the Interior and Commerce through the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service[1] (NMFS), respectively. Species listed as endangered or threatened under the FESA are provided protection from federal actions that would jeopardize the species' continued existence or destroy or adversely modify critical habitat for the species.

Under Section 4 of the FESA, the USFWS must designate critical habitat for federally listed species, concurrent with listing that species, to the maximum extent prudent and determinable. The FESA requires designation of critical habitat for listed species to be based on those physical or biological features that are essential for the conservation of the species and according to the best scientific and commercial data available. As defined in the FESA, conservation means the use of all methods and procedures that are necessary to bring any listed species to the point at which the measures provided pursuant to the FESA are no

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[1] No species under the jurisdiction of NMFS are covered by this HCP.

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longer needed. Critical habitat is protected under Section 7 of the FESA with regard to actions carried out, authorized, or funded by a federal agency. Federal agencies must ensure that their actions are not likely to result in the destruction or adverse modification of critical habitat.

Section 9 of the FESA and accompanying federal regulations prohibit the taking of fish and wildlife species listed as threatened or endangered by nonfederal agencies and private companies and individuals. As defined in the FESA, taking means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or to attempt to engage in such conduct." By regulation, the USFWS has defined harm as an act, "which actually kills or injures," listed wildlife; harm may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Section 9 of the FESA also offers limited protection for federally listed plants. Under Section 9, it is unlawful for any person, "subject to the jurisdiction of the United States," to "remove and reduce to possession, . . .maliciously damage . . . or destroy," any such plant species from areas under federal jurisdiction (such as national forests and park lands). It also is unlawful under Section 9 for any such person to "remove, cut, dig up, or damage or destroy any such species" on any other area "in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law." Under Section 9 of the FESA, therefore, plants are protected from these types of takings on private lands to the extent these species are protected under state law.

In recognition that take cannot always be avoided, Section 10(a) of the FESA includes provisions that allow for takings by nonfederal entities that are incidental to, but not the purpose of, otherwise lawful activities. Similar provisions are found in Section 7 for actions by federal agencies. Under Section 10(a), the USFWS is authorized to issue ITPs. Applicants for such permits must submit habitat conservation plans that specify the following:

- Impact(s) that will likely result from the taking
- Measures the applicant will take to minimize and mitigate the impacts
- Source of funding available to implement the measures
- Alternatives to the taking and the reason the alternatives were not chosen
- Any other measures considered by the Secretary of the Interior (i.e., USFWS) as necessary or appropriate for minimizing or mitigating the impacts of the taking

Upon review of a completed application and HCP, the USFWS must find all of the following before an ITP can be issued:

- Taking will be incidental to an otherwise lawful activity.
- Applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking.
- Applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided.
- Taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.

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- Applicant will ensure that other measures (if any) required by the approving agency will be met.
- Approving agency is assured that the conservation plan will be implemented.

Because issuance of an ITP is a federal action, the USFWS must comply with the consultation requirements of Section 7 of the FESA, the public review provisions of the FESA, and the environmental analysis and public review requirements of the NEPA, as amended.

Although phrased in terms of criteria for issuance of an ITP, Section 10(a)(1)(B) also was intended by Congress to authorize the USFWS to approve HCPs for unlisted as well as listed species. Moreover, if an HCP treats an unlisted species as if it were already listed, additional mitigation will not be required within the area covered by the HCP upon the listing of that species. As stated by the Conference Committee when Section 10 was added to the FESA in 1982:

> "*The committee intends that the Secretary [of the Interior] may utilize this provision to approve conservation plans which provide long-term commitments regarding the conservation of listed as well as unlisted species and long-term assurances to the proponent of the conservation plan that the terms of the plan will be adhered to and that further mitigation requirements will only be imposed in accordance with the terms of the plan. In the event that an unlisted species addressed in an approved conservation plan is subsequently listed pursuant to the Act, no further mitigation requirements should be imposed if the conservation plan addressed the conservation of the species and its habitat as if the species were listed pursuant to the Act (House of Representatives Conference Report No. 97-835, 97th Congress, 2d Session, p. 30).*"

The No Surprises policy adopted by the U.S. Department of the Interior provides that landowners who have habitat for listed species on their property and agree to an HCP under the FESA will not be subject to later demands for more land, water or financial commitment if the HCP is adhered to, even if the needs of the species change over time (63 Fed. Reg. 8859).

1.8.2 Bald Eagle and Golden Eagle Protection Act

The Bald Eagle and Golden Eagle Protection Act (BEPA) explicitly protects the bald eagle and golden eagle and imposes its own prohibition on any taking of these species. As defined in the BEPA, take means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb. Current USFWS policy is not to refer the incidental take of bald eagles for prosecution under the Bald Eagle and Golden Eagle Protection Act (USFWS 1996). For golden eagles, the ITP would serve as a Special Purpose Permit should golden eagles become listed in the future (USFWS 1996).

1.8.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act makes it unlawful to pursue, hunt, capture, kill, or possess or attempt to do the same to any migratory bird or part, nest, or egg of such bird listed in wildlife protection treaties between the U.S. and Great Britain, United Mexican States, Japan, and the Union of Soviet States. As with the FESA, the act also authorizes the

Secretary of the Interior to issue permits for take. The procedures for securing such permits are found in Title 50 of the *Code of Federal Regulations (CFR)*, together with a list of the migratory birds covered by the act. The USFWS has determined that an ITP issued under Section 10 of the FESA also constitutes a Special Purpose Permit under *50 CFR* 21.27 for migratory birds that are listed under the FESA. For unlisted migratory bird species, the ITP would serve as a Special Purpose Permit should a covered species become listed in the future. The USFWS has determined that take of listed migratory bird species allowed under an ITP will not be in violation of the Migratory Bird Treaty Act of 1918 (USFWS 1996).

1.8.4 National Environmental Policy Act

NEPA, as amended, requires the analysis and full public disclosure of the potential environmental impacts of a proposed federal action. The issuance of an ITP under Section 10(a) by the USFWS constitutes a federal action that requires NEPA compliance. The EIR/EIS for the IID Water Conservation and Transfer Project addresses the effects of issuance of an ITP to IID and fulfills the NEPA requirements associated with this federal action.

1.8.5 Salton Sea Restoration Project

Congress passed Public Law (PL) 102-575 in 1992. The law directs the Secretary of the Interior to "conduct a research project for the development of a method or combination of methods to reduce and control salinity, provide endangered species habitat, enhance fisheries, and protect human recreational values in the area of the Salton Sea." The Salton Sea Reclamation Act of 1998 ([PL 105-372), developed in response to these conditions, directs the Secretary to do the following:

> *"…complete all studies, including, but not limited to environmental and other reviews, of the feasibility and benefit-cost of various options that permit the continued use of the Salton Sea as a reservoir for irrigation drainage and: (i) reduce and stabilize the overall salinity of the Salton Sea; (ii) stabilize the surface elevation of the Salton Sea; (iii) reclaim, in the long term, healthy fish and wildlife resources and their habitats; and (iv) enhance the potential for recreational uses and economic development of the Salton Sea."*

The purpose and need for the Salton Sea Restoration Project is to maintain and restore ecological and socioeconomic values of the Salton Sea to the local and regional human community and to the biological resources dependent upon the Sea. These requirements are reflected in the directives of PL 105-372. The project is intended to have ecological, recreational, and economic benefits.

Prior to implementing the NEPA/California Environmental Quality Act (CEQA) process, the Salton Sea Authority and the Bureau of Reclamation, working jointly with stakeholders and members of the public, developed five goal statements. The goal statements are consistent with the direction contained in PL 105-372, address the underlying purpose and need for the project, and provide guidance for developing project alternatives. The five goals of the Salton Sea Restoration Project are:

1. Maintain the Sea as a repository of agricultural drainage

2. Provide a safe, productive environment at the Sea for resident and migratory birds and endangered species
3. Restore recreational uses at the Sea
4. Maintain a viable sport fishery at the Sea
5. Enhance the Sea to provide economic development opportunities

To implement the directive provided in PL 105-372, the Salton Sea Authority, as the lead California agency under CEQA, and Reclamation, as the lead Federal agency under NEPA, released a Draft EIS/EIR in January 2000, that evaluated alternative methods of restoring the Salton Sea. A revised alternatives document and modeling and impact analyses are currently being prepared.

1.8.6 California Endangered Species Act

The CESA is part of the California Fish and Game Code (Code). As a guide to state agencies, Section 2053 of the Code states that,

> *" . . . it is the policy of the state that state agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives consistent with conserving the species or its habitat which would prevent jeopardy."*

The CESA also states, however, that such reasonable and prudent measures must at the same time maintain the project purpose to the greatest extent possible.

Section 2080 of the CESA prohibits import, export, take, possession, purchase, or sale of listed plant and animal species except as otherwise provided in other provisions of the CESA or the Code. The state restrictions under CESA on take differ from those under the FESA in how take is defined. For CESA, take is defined to mean, "hunt, pursue, catch, capture, or kill or attempt the same." Noticeably absent from this definition are certain types of takings prohibited under Section 9 of the FESA (i.e., to harm or harass a listed species). Accordingly, Section 2080 of CESA prohibits the take of listed species except as otherwise provided under CESA or the Code, including the Native Plant Protection Act. Take of state-listed species may be authorized under CESA Section 2081. As specifically regards plants, Section 2080 of CESA prohibits the take of listed species except as otherwise provided under CESA or the Code, including the Native Plant Protection Act (commencing with Section 1900 of the Code).

Under Section 2081(b), CDFG may authorize, by permit, the take of state-listed endangered species, threatened species, and candidate species if all of the following conditions are met:

(a) The take is incidental to an otherwise lawful activity.

(b) The impacts of the authorized take are minimized and fully mitigated. The measures required to meet this obligation must be roughly proportional in extent to the impact of the authorized taking on the species. Where various measures are available to meet this obligation, the measures required shall maintain the applicant's objectives to the greatest extent possible. All required measures shall be capable of successful implementation.

(c) The permit is consistent with any regulations adopted pursuant to Sections 2112 and 2114 of the Code.

(d) The applicant must ensure adequate funding to implement the minimization and mitigation measures, and for monitoring compliance with, and effectiveness of, those measures.

(e) The permit will not jeopardize the continued existence of the species.

CDFG will make this determination based on the best scientific and other information that is reasonably available, and shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of known population trends; known threats to the species; and reasonably foreseeable impacts on the species from other related projects and activities.

IID is seeking incidental take authorization under Section 2081 for take of state listed and unlisted species (Table 1.5-1) that could occur as a result of O&M activities and activities associated with the water conservation and transfers in the Imperial Valley, Salton Sea and along the AAC. In addition, IID is seeking authorization under Section 2081 for incidental take of state-listed species that inhabit the LCR and could be affected by the change in the point of diversion of water conserved by IID and transferred to SDCWA or MWD. Appendix F contains the information and analyses necessary for CDFG to issue the ITP.

1.8.7 California Environmental Quality Act

Similar to NEPA, the CEQA requires state agencies empowered to make discretionary permitting decisions to evaluate the environmental effects of a proposed project. Issuance of a 2081(b) permit constitutes a state action requiring compliance with CEQA. The EIR/EIS for the IID Water Conservation and Transfer project addresses the effects of issuance of a 2081(b) permit to IID and fulfills the CEQA requirements associated with this state action.

1.8.8 California Native Plant Protection Act

The California Native Plant Protection Act (NPPA) includes measures to preserve, protect, and enhance rare and endangered native plants in addition to those provided under CESA. The definitions of rare and endangered in the NPPA differ from those in the CESA, but the list of protected native plants encompasses federal and state ESA candidate, threatened, and endangered species. The act also includes its own restrictions on take, stating that, “[n]o person shall import into this state, or take, possess, or sell within this state,” any rare or endangered native plant, except as provided in the NPPA. The exception is where landowners have been notified of the presence of protected plants by CDFG; they are required to notify CDFG at least 10 days in advance of changing land uses to allow CDFG an opportunity to salvage the plants.

1.8.9 California Fully Protected Species Statutes

Several proposed covered species are subject to the provisions of the fully protected species statutes in the Code. The fully protected species statute prohibits the “take” (as defined in the Code) of fully protected species and does not currently include a mechanism for authorizing take of fully protected species. The fully protected species in the HCP area are listed in Table 1.5-1.

CHAPTER 2

Existing Conditions in the HCP Area

2.1 Location and Regional Setting

Imperial Irrigation District (IID) is located in the Imperial Valley in the southeast corner of California, east of Los Angeles and San Diego. Imperial Valley lies within the Salton Trough (Cahuilla Basin), an area of very flat terrain. The Salton Trough encompasses a large portion of the Colorado Desert (a subdivision of the Sonoran Desert, extending through portions of Mexico and Southern Arizona) with much of the area below sea level.

2.2 Physical Environment

2.2.1 Climate

The Imperial Valley is one of the most arid regions in the United States. The climate of the Habitat Conservation Plan (HCP) area is that typical of desert regions, with hot, dry summers and high winds, with occasional thunderstorms and sandstorms. Summer air temperatures typically are above 100° Fahrenheit (F) and can reach 120°F. Winter temperatures generally are mild, usually averaging above 40°F, but frost may occur occasionally.

The prevailing winds in Imperial Valley are from the west. Average wind speeds range from 4 to 7 miles per hour. However, at the Salton Sea, the winds are predominantly from the east in the northern portions of the sea, while in the southern portions of the sea, westerly winds predominate similar to the rest of the Imperial Valley.

The rain fall can occur from November through March, but because the area is in the rainshadow of the Peninsular Ranges, it receives little precipitation. The 85-year average annual rainfall is 2.93 inches. June is the driest month; precipitation in June has only occurred three times during the period of record. Precipitation in the form of snowfall was recorded only once.

2.2.2 Topography

The Salton Trough is a basin and the most dominant landform in Imperial County. Approximately 130 miles long and 70 miles wide, the Salton Trough is a seismically active rift valley, and encompasses the Imperial Valley, the Mexicali Valley, and the Gulf of California in Mexico in the south and the Coachella Valley in the north (Reclamation and SSA 2000). The Salton Sea is in the northern portion of the Salton Trough.

As discussed above, the basin topography is relatively flat with little topographic relief. The Sand Hills are an area of windblown sand deposits that form a 40-mile-long by 5-mile-wide belt of sand dunes extending along the east side of the Coachella Canal from the Mexican border northward. Within the Coachella and Imperial Valleys, an old lake shoreline (Lake Cahuilla) has been identified by the presence of lacustrine deposits. The Imperial Formation, which is marine in origin, underlies the sequence of sedimentary layers within the basin. The Imperial Formation is underlain by igneous and metamorphic basement rocks (Reclamation and SSA 2000).

In the dry climate of Imperial County, the soils of Imperial County, unless they are irrigated, have no potential for farming (County of Imperial 1997). Lacustrine basin soils in the Imperial Valley formed on nearly level old lake beds in the area of ancient Lake Cahuilla. These soils generally consist of silty clays, silty clay loams, and clay loams and are deep, highly calcareous, and usually contain gypsum and soluble salts. The central irrigated area served by the IID generally has fine-textured silts and is primarily used for cropland. Continued agricultural use of soils within IID required installation of subsurface tile drains to carry away water and salts that would otherwise build up in the soils and prevent crop growth. Tile drains discharge this flow to surface drains (IID 1994). Sandy soils, typical of the deserts in the southwest U.S., are predominant in higher elevations, such as the East and West Mesas, and generally are used for recreation and desert wildlife habitat. The irrigated portion of Imperial Valley generally is flat and has low levels of natural erosion.

The Imperial Valley is located within one of the most tectonically active regions in the United States, and therefore is subject to potentially destructive and devastating earthquakes. Additionally, the Imperial Valley is susceptible to other geologic hazards including liquefaction and flooding.

2.2.3 Hydrology and Water Quality of the Imperial Valley

Surface water within the Imperial Valley comes primarily from two sources: the Colorado River and inflow across the International Boundary from Mexico via the New River. Agricultural production served by IID is almost entirely dependent on surface water that is diverted from the Colorado River and into the IID distribution system. After application to farm fields for irrigation purposes, the water is collected in drains. The drains transport water directly to the Salton Sea or to the New or Alamo Rivers that discharge to the Salton Sea. With no outlet, the Salton Sea is a terminal sink for drain water from Imperial Valley.

2.2.3.1 Water Quality

Irrigation Delivery Water

The IID water distribution system begins at the Colorado River where water is diverted at the Imperial Dam and conveyed by gravity through the All American Canal (AAC). The AAC discharges water to three major distribution canals in the IID service area—the East Highline, Central Main, and Westside Main Canals. These three canals serve as the main arteries of a system consisting of approximately 1,667 miles of canals and laterals that distribute irrigation water within IID's service area.

About 4.4 million acre-feet per year (MAFY) of water per year is diverted into the AAC at Imperial Dam. Of this total, flow measurements (collected from 1986 to 1999 at Drop No. 1, just before the AAC enters the IID Service Area) show that Colorado River irrigation deliveries generally range from approximately 2.4 MAFY to more than 3.2 MAFY. The average annual delivery of irrigation water during the same period is approximately 2.8 MAFY. The remaining balance of diverted water is discharged into the Yuma Main Canal, the Gila Gravity Main Canal, returned to the Colorado River for Mexico's use via Pilot Knob, diverted into the Coachella Canal or is lost to spillage, evaporation or seepage.

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Colorado River diversions account for approximately 90.5 percent of all water flowing through IID. The remaining water components flowing through IID include: flow from the New River across the International Boundary at approximately 5 percent, rainfall at approximately 4 percent, net groundwater discharge to the irrigation system of less than 1 percent, and flow from the Alamo River across the International Boundary at less than 0.1 percent.

The delivery of Colorado River water to IID is driven by user demand. This demand is not constant throughout the year, but varies because of a combination of influences such as changes in climate and local rainfall conditions, crop cycles, and government crop programs. Demand is typically highest in April and remains fairly high until August when it starts to decline.

Colorado River water imported by IID is either used consumptively, or is collected in surface drains or rivers. Consumptive use includes transpiration by crops and evaporation directly from soil or water surfaces. Approximately 66 percent of the water that is delivered for on-farm use is used for crop production and leaching and roughly 3 percent is lost to evaporation. The remaining water delivered for on-farm use discharges into the IID drainage system as surface runoff or is lost to shallow groundwater.

Drainage Water

The IID drainage system includes a network of surface and subsurface drains. Water entering the drainage system can originate from the following sources:

- Operational discharge (i.e., water that has traveled through portions of the IID water conveyance system and was not applied to land). The main components of operational discharge are canal seepage and canal and lateral spillage. Canal and lateral spillage refers to unused water that is discharged from the delivery system to the surface drains or river systems.
- On-farm tailwater runoff (i.e., surface water runoff occurring at the end of an irrigated field)
- On-farm leaching (i.e., water passing the crop root zone that normally enters a tile drain; also referred to as tilewater)
- Stormwater runoff
- Groundwater

Water collected by the tile drainage systems either flows by gravity or is pumped to surface drains, which discharge to the Salton Sea either directly or via the New and Alamo Rivers. With the exception of drainage water that is returned to the fields as irrigation water or flow lost to shallow and deep groundwater aquifers (through deep percolation that is not captured by the tile drains), all flow collected by the IID drainage system is ultimately conveyed to the Salton Sea.

Water applied to the fields in IID serves two purposes: to replenish moisture in the crop root zone and to leach accumulated salts from the soils. According to a recent study by IID, approximately 15 percent of the water applied to IID fields runs off as tailwater. Except in those fields with tailwater recovery systems, this water is no longer available for on-farm

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use and is discharged into either surface drains or rivers. Approximately 16 percent of irrigation water delivered to fields is used for the leaching of salts accumulated in the soils. This water percolates to the tile drainage system where it is collected and conveyed to the IID surface drains.

Collectively, tilewater and tailwater drainage accounts for roughly 67 percent (34 and 33 percent, respectively) of all of the IID drainage discharged to the Salton Sea either directly or via the New and Alamo Rivers. The Alamo River receives approximately 61 percent of the discharge from the IID drainage system, and the New River receives roughly 29 percent of the District's drainage. The remaining 10 percent is discharged from the drainage system directly to the Salton Sea. Total IID discharge to the Salton Sea has averaged about 1.16 MAFY during 1986 to 1999. Figure 2.2-1 shows the annual variability of IID's total surface discharge to the Salton Sea during 1986 to 1999.

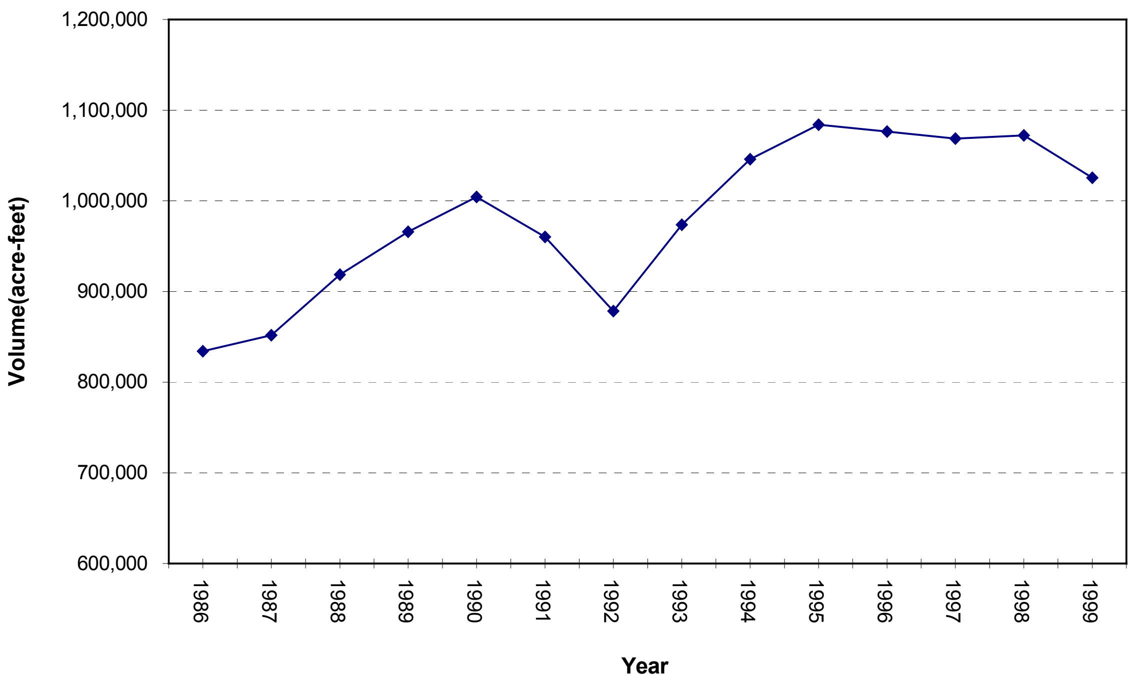

FIGURE 2.2-1
Total Farm Drainage from IID Discharging into the Salton Sea (1986-1999)

Alamo River

The Alamo River enters IID from Mexico. Currently, there is no flow in the Alamo River coming from Mexico across the International Boundary because of the installation of a dam at the boundary in 1996 by Mexico. However, the previous 5-year average annual flow volume at the US/Mexico border was less than 2 thousand acre-feet per year (KAFY). The Alamo River receives drainage from about 58 percent of the IID area and accounts for about 61 percent of IID's drainage discharge. Outflow from the Alamo River to the Salton Sea is estimated at about 605 KAFY, with about 168 KAF from rainfall; municipal, industrial, and operational discharge; and seepage, 211 KAF from tailwater, and 223 KAF from tilewater.

New River

The New River also enters IID from Mexico, but, unlike the Alamo, the New River serves as an open conduit for untreated municipal sewage, heavy metals, and agricultural drainage waters high in pesticide residues from northern Mexico. The average annual flow volume of the New River at the International Boundary during the period 1987 to 1998 was about 165 KAFY, which comprised approximately one-third of the total flow of the New River at its discharge to the Salton Sea. Therefore, the New River is a significant source of pollutant loading into the Salton Sea. Water demand and discharges in Mexico might affect annual flows, and flow volumes at the boundary have changed dramatically during the period of record. Gage data shows flow in the New River at an average annual low of 41 KAFY from the period 1950 to 1957, increasing to an average of 110 KAFY during the period 1958 to 1978. Flows across the boundary increased again to an annual average of 150 KAFY during the period 1979 to 1982, and then again from 1983 to 1988 to values higher than 250 KAFY. The discharge from Mexico leveled back to approximately 100 KAFY for the period 1987 to 1999.

The New River receives approximately 29 percent of the drainage from IID, and including input from Mexico, accounts for about 39 percent of the total discharge from the IID water service area to the Salton Sea. The average annual flow from the New River to the Salton Sea is made up of approximately 81 KAFY from rainfall, municipal and industrial effluent, IID operational discharge, and canal seepage; 102 KAFY from tailwater; and 108 KAFY from on-farm tile drainage, for a total of 291 KAFY, with the remainder of the flow coming from Mexico and net river losses.

2.2.3.2 Water Quality

Water quality in the HCP area is determined by the quality of water diverted from the Colorado River, the water quality of water in the New River as it crosses the International Boundary, and agricultural practices. The following sections summarize water quality information for:

- Irrigation delivery water
- Drainage water
- Alamo River water
- New River water

Additional information on water quality conditions in the HCP area is provided in Section 3.2 of the environmental impact report/environmental impact statement (EIR/EIS).

Table 2.2-1 summarizes water quality data for irrigation delivery water, drainage water, New River, and Alamo River water. Information from two data sets is summarized: (1) “Recent” water quality data, and (2) “Long-term” water quality data. The “Recent” water quality data consists of data obtained during a coordinated monitoring effort at the following locations:

- AAC
- Surface drains that discharge to the Alamo River
  - South Central Drain
  - Holtville Main Drain

TABLE 2.2-1
Long-Term[a] and Recent[b] Mean Flows and Concentrations for Water Quality Parameters in IID's Service Area

	Colorado River Irrigation Delivery in AAC		New River							Alamo River						
	Long-Term[a]	Recent[b]	Long-Term[a]			Recent[b]				Long-Term[a]			Recent[b]			
Parameter	AAC	AAC	Mexico Border	Surface Drains	Outlet to Salton Sea	Border	Greeson	Trifolium 12	Outlet to Salton Sea	Mexico Border	Surface Drains	Outlet to Salton Sea	Border	South Central	Holtville Main	Outlet to Salton Sea
Daily mean flow (cfs)	3,934	—	250	—	622	—	—	—	—	—	—	843	—	—	—	—
Instantaneous flow (cfs)	—	—	193	—	—	—	—	—	—	2	—	—	—	—	—	—
TDS (mg/L)	771	773	3,894	2,116	2,997	2,676	2,033	2,143	2,743	3,191	2,375	2,458	—	2,269	2,347	2,318
TSS (mg/L)	86	11	117	193	313	52	188	189	241	360	318	479	—	329	175	300
Se (µg/L)	2.5	2.12	3.0	7.4	7.1	ND	5.24	6.03	4.09	5.9	7.9	7.7	—	8.77	5.63	7.53
NO3 (mg/L)	0.28	0.4	0.84	7.49	4.37	0.5	4.2	13.0	4.3	1.87	8.14	7.81	—	9.9	8.3	6.4
Total phosphorus (mg/L)	0.05	0.13	1.42	0.78	0.81	2.00	0.77	0.37	1.26	0.47	0.84	0.63	—	0.74	0.61	0.75
Total P in sediment (mg/kg)	—	—	535	1,300	1,600	—	—	—	—	—	—	1,100	—	—	—	—
DDT (µg/L)	0.001	—	0.088	0.013	0.016	—	—	—	—	0.011	0.020	0.016	—	—	—	—
DDT in sediment (µg/kg)	—	—	0.1	2.6	11.0	—	—	—	—	0.1	14.6	0.1	—	—	—	—
DDD (µg/L)	0.001	—	0.046	0.010	0.017	—	—	—	—	0.011	0.017	0.011	—	—	—	—
DDD in sediment (µg/kg)	—	—	—	5.4	—	—	—	—	—	—	6.3	—	—	—	—	—
DDE (µg/L)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DDE in sediment (µg/kg)	—	—	9.8	44.1	9.8	—	—	—	—	18.0	15.7	30.0	—	—	—	—
Toxaphene (µg/L)	0.001	—	0.272	0.946	0.013	—	—	—	—	0.100	0.995	0.014	—	—	—	—

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TABLE 2.2-1
Long-Term[a] and Recent[b] Mean Flows and Concentrations for Water Quality Parameters in IID's Service Area

	Colorado River Irrigation Delivery in AAC		New River							Alamo River						
	Long-Term[a]	Recent[b]	Long-Term[a]			Recent[b]				Long-Term[a]			Recent[b]			
Parameter	AAC	AAC	Mexico Border	Surface Drains	Outlet to Salton Sea	Border	Greeson	Trifolium 12	Outlet to Salton Sea	Mexico Border	Surface Drains	Outlet to Salton Sea	Border	South Central	Holtville Main	Outlet to Salton Sea
Toxaphene in sediment (µg/kg)	—	—	10.0	9.5	18.3	—	—	—	—	5.0	26.6	2.5	—	—	—	—
Diazinon (µg/L)	—	—	—	0.025	—	—	—	—	—	—	—	0.025	—	—	—	—
Chlorpyrifos (µg/L)	—	—	—	0.025	—	—	—	—	—	—	—	0.025	—	—	—	—
Dacthal (µg/L)	0.007	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Boron (µg/L)	170	143	1,600	804	1,172	—	456	584	905	1,798	683	695	—	438	609	558

[a] Long-Term data collected from 1970 to 1999 and compiled from various sources (see text for greater explanation).
[b] Recent data collected by the Colorado River Basin Regional Water Quality Control Board from 1996 through 1999.

NOTES
— = Data Not Available
ND = Not Detected
cfs = cubic feet per second
mg/L = milligrams per liter
µg/L = micrograms per liter
µg/kg = micrograms per kilogram

- Surface drains that discharge to the New River
  - Greeson Drain
  - Trifolium 12 Drain
- New River at the International Boundary
- New River at the outlet to the Salton Sea
- Alamo River at the outlet to the Salton Sea

The water quality information contained in this data set was collected and compiled by the Colorado River Basin Regional Water Quality Control Board from 1996 through 1999. The information represents the most current water quality data available. The data were collected from each of the sampling locations listed above during the same time period.

The "long-term" water quality data set includes data collected during numerous monitoring events from sites located throughout the IID service area. This database was compiled for modeling purposes and was obtained from various sources, including the U.S. Environmental Protection Agency's Storage and Retrieval Environmental Data System, U.S. Geological Service's Water Quality Network, Colorado River Basin Regional Water Quality Control Board, and published and unpublished papers and documents. These sources contained water quality data collected within Imperial County over many years. However, for the modeling associated with the water conservation and transfer programs, the data were limited to those collected between 1970 and 1999.

Although the long-term water quality data set contained many samples, the data tended to be collected sporadically in time and at readily accessible sites. Thus, even though the time period for sample collection ranges from 1970 to 1999, the samples were not collected at all sites, nor were they collected on a regular basis. Further, the numbers of analyses for any one constituent ranged from very few to several hundred. Because of the lack of good temporal coverage, the data were grouped by month through the entire study period. The data were then grouped spatially and assigned to distinct geographic locations to quantify the flow and constituent concentrations from each of the various sources that flow into and discharge out of the IID service area. As a result, the data are reported as mean concentrations of the cumulative flows at the following locations:

- IID irrigation delivery water at the AAC
- Alamo River drainage basin
  - Alamo River at the International Boundary
  - IID surface drain discharge to the Alamo River
  - Alamo River at the Salton Sea
- New River drainage basin
  - New River at the International Boundary
  - IID surface drain discharge to the New River
- New River at the Salton Sea

Surface water that is diverted from the Colorado River is the only water available to IID for agricultural use with the exception of rainfall and minor contributions from groundwater sources. The chemical characteristics of the water entering the IID agricultural area change little between the source at the Colorado River and the points where the water enters the delivery systems of the individual fields.

Recent water quality data (1996 to 1999) collected from the AAC shows the following:

- Concentrations for selenium range from 1.94 to 2.42 micrograms per liter (µg/L), and concentrations for boron range from 110 to 190 µg/L. Mean concentrations for selenium and boron are 2.12 and 142.5 µg/L, respectively.
- The concentration of nitrate as nitrogen ranges from non-detectable (at 0.2 milligrams per liter [mg/L]) to 0.40 mg/L. Phosphorous concentrations range from 0.05 to 0.21 mg/L, and the mean concentration of phosphorus is 0.13 mg/L.
- Mean concentrations for selenium and boron during the period 1970 through 1999 are similar to the concentrations shown in the recent data.

Water quality data for total dissolved solids (TDS) show that the annual mean concentration for the period 1970 through 1999 is 771 mg/L. Mean concentrations in the irrigation delivery water were highest during the late 1970s and early 1980s, with concentrations more than 850 mg/L. Starting in 1983, TDS concentrations in the influent decreased to a low of about 525 mg/L in 1986. The major factor contributing to this fluctuation was the unusually high flows carried by the Colorado River during the mid-1980s. Since 1986, TDS concentrations in the irrigation delivery water have gradually increased. Recent data from the 1996 to 1999 period show that TDS concentrations range from 720 to 820 mg/L, and the average concentration for TDS during this period is 772.5 mg/L.

Long-term mean concentrations for the organochlorine insecticides dichloro-diphenyl-tricloroethane (DDT), dichloro-diphenyl-diclhloroethane (DDD), and toxaphene in IID irrigation delivery water are all at or below detection limits of 0.001 µg/L. The long-term mean concentration for organochlorine herbicide Dacthal is 0.007 µg/L.

Drainage Water

Water entering the drainage system primarily comes from three sources: operational discharge, tailwater, and tilewater. Analysis of water discharging to the drainage system indicates the following:

- Operational discharge is considered to have the best water quality because it is not applied to the land and, thus, it should be similar in quality to water entering the IID service area directly from the Colorado River.
- Tailwater is considered the next best in terms of quality. However, tailwater accumulates certain amounts of sediment and solutes (including agricultural chemicals such as fertilizers and pesticides) from the soil as it flows across the cultivated fields.
- Tilewater is generally considered the poorest of the water sources because dissolved salts and other constituents tend to concentrate in the water as it percolates through the root zone and is collected in the subsurface drainage collection system.

Water quality data has been recently (1996 to 1999) collected for four drains in the HCP area: South Central, Holtville Main, Greeson, and Trifolium 12. South Central and Holtville Main drain to the Alamo River while Greeson and Trifolium 12 discharge to the New River. In addition to these drains, sporadic information is available for a few other drains in the HCP area. Water quality of drain water is discussed separately for each drainage basin.

Alamo River Basin

Recent water quality data for South Central and Holtville Main drain show the following.

- Selenium concentrations in the South Central drain at its outlet range from 5.43 to 11.30 µg/L, and the mean concentration is 8.77 µg/L. Selenium concentrations in the Holtville Main drain range from 4.30 to 10.0 µg/L, and the mean concentration is 5.63 µg/L.
- Boron concentrations in the South Central drain range from 260 to 650 µg/L, and the mean concentration is 438 µg/L. Boron concentrations in the Holtville Main drain range from 330 to 740 µg/L, and the mean concentration is 609 µg/L.
- TDS concentrations in the South Central drain range from 1,510 to 3,000 mg/L, and the mean concentration is 2,269 mg/L. TDS concentrations in the Holtville Main drain range from 1,990 to 3,120 mg/L, and the mean concentration is 2,347 mg/L.
- Mean concentrations for total suspended solids (TSS), nitrate as nitrogen, and phosphorous in the South Central drain are 329, 9.9, and 0.7 mg/L, respectively. Mean concentrations of these constituents in the Holtville Main drain are 175, 8.3, and 0.6 mg/L, respectively.

The recent data set for the South Central and Holtville Main drains is useful for comparing water quality trends and values in these drains. However, data from these two drains may not be representative of the entire Alamo River drainage system.

Long-term mean concentrations for selenium, boron, and TDS in surface drains in the Alamo River drainage basin are 7.9 µg/L, 683 µg/L, and 2,375 mg/L, respectively (Table 2.2.1). Long-term mean concentrations for DDT, DDD, and toxaphene in surface drains in the Alamo River drainage basin are 0.02, 0.017, and 0.99 µg/L, respectively.

New River Basin Drains

Based on the recent water quality data set, the range (minimum and maximum) and mean concentration values for selenium, boron, TDS, TSS, nitrate as nitrogen, and phosphorus in the Greeson and Trifolium 12 drains are discussed below.

- Selenium concentrations in the Greeson drain range from 3.58 to 6.76 µg/L, and the mean concentration is 5.24 µg/L. Selenium concentrations in the Trifolium 12 drain range from 3.01 to 15.0 µg/L, and the mean concentration is 6.03 µg/L.
- Boron concentrations in the Greeson drain range from 240 to 680 µg/L, and the mean concentration is 456 µg/L. Boron concentrations in the Trifolium 12 drain range from 250 to 1,000 µg/L, and the mean concentration is 584 µg/L.
- TDS concentrations in the Greeson drain range from 1,490 to 2,840 mg/L, and the mean concentration is 2,033 mg/L. TDS concentrations in the Trifolium 12 drain range from 1,260 to 4,380 mg/L, and the mean concentration is 2,143 mg/L.

- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous in the Greeson drain are 188, 4.2, and 0.8 mg/L, respectively. Mean concentrations of these constituents in the Trifolium 12 drain are 189, 13.0, and 0.4 mg/L, respectively.

The recent data set for the Greeson and Trifolium drains is useful for comparing water quality trends and values in these drains. However, data from these two drains may not be representative of the entire New River drainage system.

Long-term mean concentrations for selenium, boron, and TDS in surface drains in the New River drainage basin are 7.4 µg/L, 804 µg/L, and 2,116 mg/L, respectively. Long-term mean concentrations for DDT, DDD, toxaphene, diazinon, and chloropyrifos in surface drains in the New River drainage basin are 0.013, 0.010, 0.95, 0.025, and 0.025 µg/L, respectively. Concentration values for dichlorophenyl-dichloroethene (DDE) and Dacthal in drain discharge to the New River are unavailable for the long-term period. Overall, the long-term constituent concentration values in the New River drains are similar to the long-term concentration values observed in the Alamo River drains.

Flow at the International Boundary with Mexico is less than 1 percent of the Alamo River's discharge to the Salton Sea. As such, water quality and quantity at the Alamo River outlet are almost totally a function of drainage from IID. Based on the recent water quality data set, the range (minimum and maximum) and mean concentration values for selenium, boron, and TDS at the International Boundary are as follows.

- Selenium concentrations range from 3.0 to 10 µg/L, and the mean concentration is 5.9 µg/L.
- Boron concentrations range from 660 to 3,000 µg/L, and the mean concentration is 1,798 µg/L.
- TDS concentrations range from 1,866 to 4,260 mg/L, and the mean concentration is 3,191 mg/L.

Recent water quality data for the Alamo River at its outlet to Salton Sea show the following.

- Selenium concentrations range from 5.5 to 13.0 µg/L, and the mean concentration is 7.53 µg/L.
- Boron concentrations range from 320 to 800 µg/L, and the mean concentration is 558 µg/L.
- TDS concentrations range from 1,920 to 3,300 mg/L, and mean concentration is 2,318 mg/L.
- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous in the Alamo River at the outlet to the Salton Sea are 300, 6.4, and 0.8 mg/L, respectively.

These concentrations are similar to the concentration values found in drains that discharge to the Alamo River.

Long-term mean concentrations for DDT, DDD, toxaphene, diazinon, and chloropyrifos in the Alamo River at the outlet to the Salton Sea are 0.016, 0.011, 0.014, 0.025, and 0.025 µg/L, respectively.

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New River

The New River also enters IID from Mexico, but unlike the Alamo, the New River serves as an open conduit for untreated sewage, heavy metals, and pesticide residues from northern Mexico. Recent water quality data for the New River at the International Boundary show the following.

- Selenium was not detected, and boron was not analyzed in water quality samples collected at the International Boundary.
- TDS concentrations range from 1,970 to 3,480 mg/L, and the mean concentration is 2,676 mg/L.
- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous at the International Boundary are 52.2, 0.5, and 2 mg/L, respectively.

Long-term mean concentrations for selenium, boron, and TDS in the New River at the International Boundary are 3 µg/L, 1,600 µg/L, and 3,894 mg/L, respectively. Long-term mean concentrations for TSS, nitrate as nitrogen, and phosphorous at the International Boundary are similar to the concentrations seen in the recent data. Long-term mean concentrations for DDT, DDD, and toxaphene are 0.088, 0.046, and 0.27 µg/L, respectively.

Recent water quality data (1996 to 1999) for the New River at its outlet with the Salton Sea generally show the following:

- Selenium concentrations range from 2.93 to 11.0 µg/L, and the mean concentration is 4.09 µg/L.
- Boron concentrations range from 530 to 1,200 µg/L, and the mean concentration is 905 µg/L.
- TDS concentrations range from 2,320 to 3,740 mg/L, and mean concentration is 2,743 mg/L.
- Mean concentrations for TSS, nitrate as nitrogen, and phosphorous measured in samples collected from the New River outlet to the Salton Sea are 241 mg/L, 4.3 mg/L, and 1.3 mg/L, respectively.

Long-term mean concentrations for selenium, boron, and TDS in the New River outlet to the Salton Sea are 7.1µg/L, 1,172 µg/L, and 2,997 mg/L, respectively. Long-term mean concentrations for DDT, DDD, and toxaphene are 0.016, 0.017, and 0.013 µg/L.

2.3 Biological Environment

2.3.1 Overview of the Biological Environment

The HCP area lies within the California Desert. Before European settlement, the area consisted of native desert vegetation and associated wildlife. Periodically, the Colorado River changed course and flowed northward into the Salton Trough forming a temporary, inland sea. These former seas persisted as long as water entered from the Colorado River, but evaporated when the river returned to its previous course. Thus, despite the periodic occurrence of a lake within the Salton Trough, the HCP area consisted predominantly of a desert ecosystem.

The Salton Sea represents the remnants of the most recent occurrence of flooding by the Colorado River when in 1905 the river breached an irrigation control structure and flowed into the Salton Trough. Initially, the surface elevation of the Salton Sea reached –197 feet mean sea level (msl), but evaporation reduced its elevation to –248 msl by 1920 (USFWS 1999a). By this time, agricultural production had increased in both the Imperial and Coachella Valleys and the Salton Sea was receiving drainage water. In 1924 and 1928, presidential orders withdrew all federal lands below –220 msl "for the purpose of creating a reservoir in the Salton Sea for storage of waste and seepage water from irrigated land in Imperial Valley." Since its formation in 1905, the Salton Sea has been sustained by irrigation return flows from the Imperial and Coachella Valleys.

The availability of a reliable water supply effected by construction of Hoover and Imperial Dams and the AAC, allowed the Imperial Valley to be brought into intensive cultivation. To support agricultural production in the valley, an extensive network of canals and drains was constructed to convey water from the Colorado River to farmers in the valley and subsequently to transport drainage water from the farms to the Salton Sea. The importation of water from the Colorado River and subsequent cultivation of the Imperial Valley radically altered the Salton Trough from its native desert condition. The availability of water in the drains and canals supported the development of mesic (marsh-associated) vegetation and in some locations patches of marsh-like habitats (e.g., along the Salton Sea and seepage from canals). These mesic habitats, in addition to the productive agricultural fields, attracted, and currently support numerous species of wildlife that would be absent or present in low numbers in the native desert habitat. Today, small areas of native desert habitat persist in the HCP area, but mainly the HCP area supports habitats created and maintained by water imported to Imperial Valley for agricultural production.

2.3.2 Wildlife Habitat

2.3.2.1 Drain Habitat

Wet area habitats within the HCP area are collectively referred to as "drain habitat." Drain habitat in the HCP area occurs in association with the drainage system, conveyance system, in managed marshes on the state and federal refuges and on private duck clubs, and as unmanaged vegetation adjacent to the Salton Sea.

Drainage System

Currently, IID operates and maintains 1,456 miles (cited from IID Memorandum, dated October 4, 2000) of agricultural drains (Figure 2.3-1). These drains typically are unlined, dirt channels with 65 miles of the drainage network in buried pipes. Main drain channels have an average depth of 8-11 feet with a typical side-slope embankment ratio of 1:1. Lateral ditches have an average depth of 7 feet, with a typical side-slope embankment ratio of 1:1. Some drainage channels are steep-sided with sloughing embankments from years of erosion prior to stabilization; others are sloped more gradually. Water flow in drains is determined by the collective irrigation practices on fields adjacent to the drains. Drains contain flows when irrigation occurs and storms may add to flows in the drains. Peak flows occur during storms and during the months of April and May.

Vegetation in the drains is limited to the embankment slope or sediments directly within the drain channel and typically consists of invasive species such as saltgrass, salt bush, bermuda

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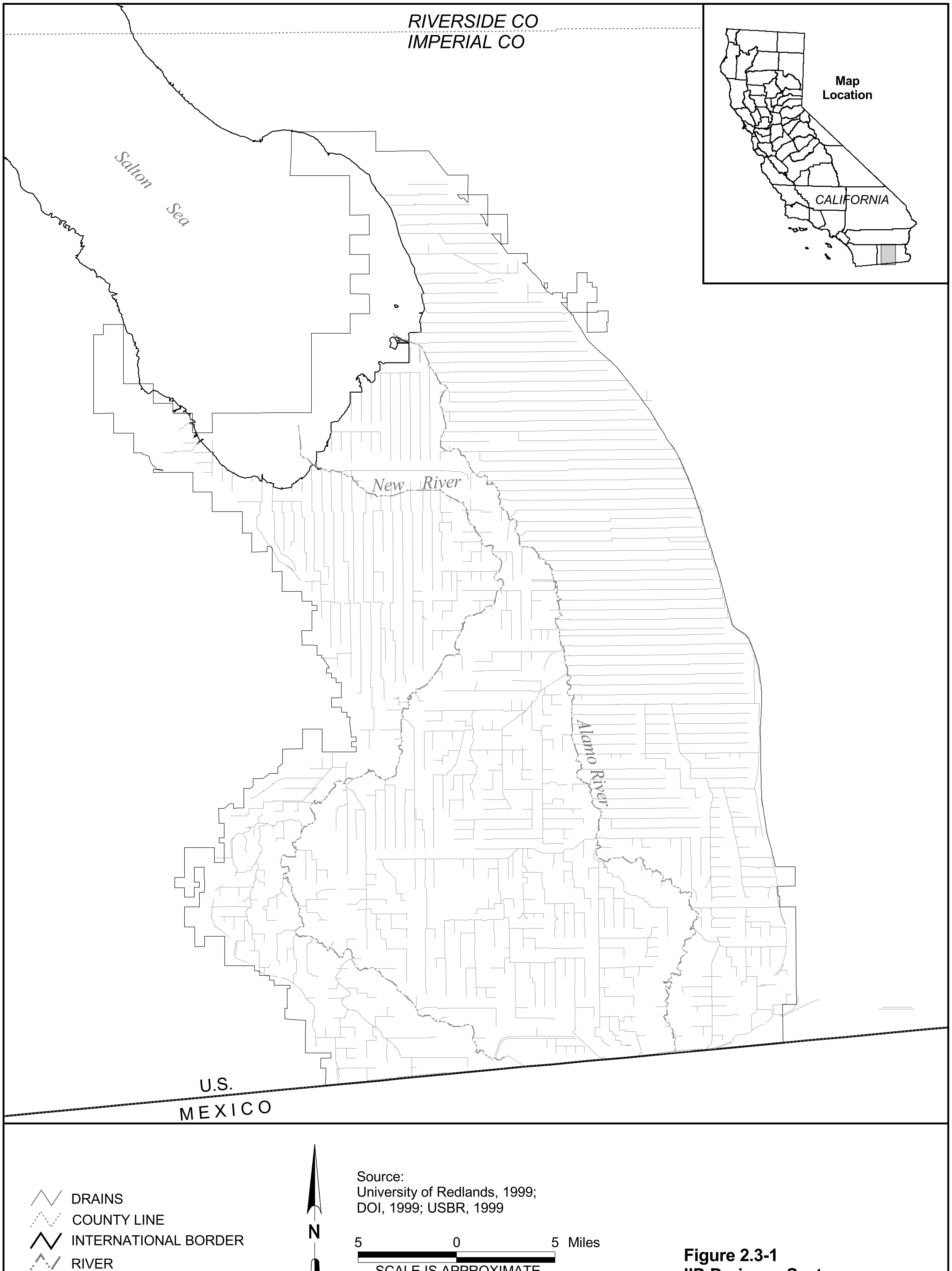

Figure 2.3-1
IID Drainage System
IID Water Conservation and Transfer Project Draft HCP

grass, common reed, and salt cedar. Vegetation adjacent to the edge of the water typically is restricted to a narrow strip from 3- to 15-feet wide, with more drought-tolerant vegetation on drain embankments. Some drain banks are devoid of vegetation with only a narrow band of saltgrass or bermuda grass adjacent to the edge of the water. Cattail, bulrushes, rushes, and sedges, occur in drain channels, typically in sparse, isolated patches. More extensive stands of cattail/bulrush vegetation may persist where maintenance activities are infrequent. In addition, stands of common reed and cattails can occur at the mouths of drains where they empty into rivers or the Salton Sea. Table 2.3-1 lists typical plant species occurring in irrigation drains in the Imperial Valley.

TABLE 2.3-1
Typical Plant Species Occurring in Drains in Imperial Valley

Adenophyllum porophylloides (false odora)	*Leptochloa uninerva* (Mexican sprangletop)
Allenrolfea occidentalis (iodine bush)	*Malvella leprosa* (alkali mallow)
Aristida oligantha (prairie three awn)	*Paspalum dilatatum* (dallisgrass)
Atriplex sp. (saltbush)	*Phragmites communis* (common reed)
Baccharis emoryi (Emory's baccharis)	*Polygonum aviculare* (prostrate knotweed)
Bassia hyssopifolia (five-hook bassia)	*Polygonum* sp. (knotweed)
Carex sp. (sedge)	*Polygonum* sp. (beard grass)
Chamaesyce melanadenia (prostrate spurge)	*Prosopis* sp. (mesquite)
Croton californicus (croton)	*Psilostrophe cooperi* (paper-daisy)
Cryptantha sp. (popcorn flower)	*Rumex crispus* (curly dock)
Cynodon dactylon (desert tea)	*Salsola tragus* (Russian thistle)
Eriogonum sp. (buckwheat)	*Scirpus* sp. (bulrush)
Heliotropium curassavicum (alkali heliotrope)	*Sesbania exaltata* (Colorado river hemp)
Juncus sp. (rush)	*Suaeda moquinii* (sea-blite)
Lactuca serriola (prickly lettuce)	*Tamarix* sp. (salt cedar)
Larrea tridentata (creosote bush)	*Typha* sp. (cattail)
Leptochloa fascicularis (bearded sprangletop)	

Sources: IID 1994; Reclamation and SSA 2000.

Maintenance activities associated with the drains include ensuring the gravity flow of tilewater into the drains, maintaining conveyance capacity and efficiency, and maintaining structural integrity of the drains. Vegetation is cleared from drains primarily via mechanical means; occasionally vegetation is controlled by prescribed burns or by chemical and biological control methods. Drains are cleaned on an as-needed basis, depending on the extent of sediment and vegetation accumulation. Drains with the lowest gradient accumulate sediment more rapidly and may require cleaning annually. Other drain segments may not require cleaning for periods of 10 years or more. Maintenance activities limit the extent of vegetation supported in the drains.

As part of the development of an EIR for IID's Modified East Lowline and Trifoloium Interceptors, and Completion Projects (IID 1994), drains were surveyed in areas potentially affected by the projects (Figure 2.3-2). In all, about 506 miles of drain were surveyed. For each drain, the general vegetation characteristics were described with particular emphasis

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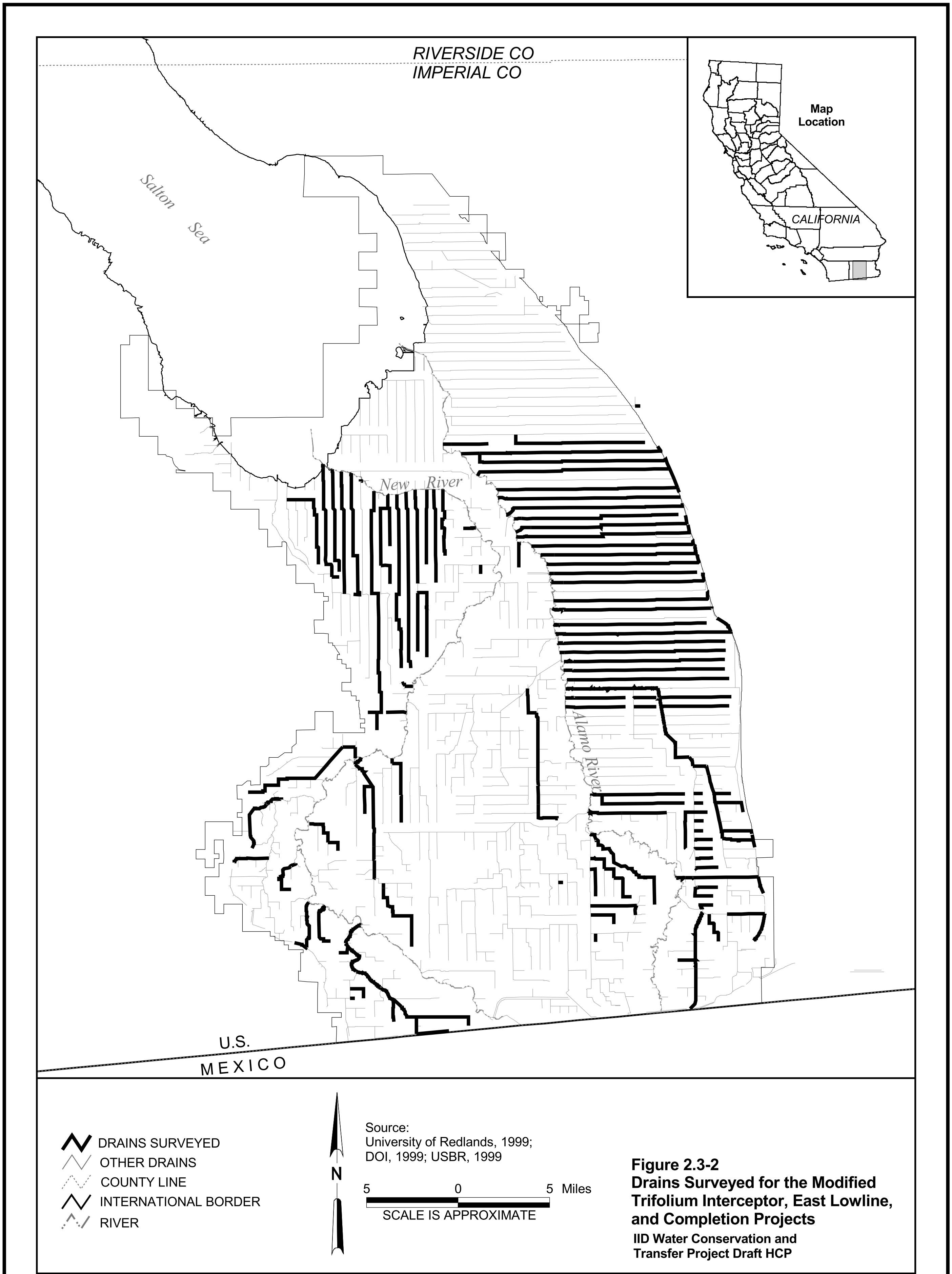

Source:
University of Redlands, 1999;
DOI, 1999; USBR, 1999

Figure 2.3-2
Drains Surveyed for the Modified Trifolium Interceptor, East Lowline, and Completion Projects
IID Water Conservation and Transfer Project Draft HCP

given to patches of cattail or bulrush vegetation. Although no quantitative data were collected, the surveys allow a qualitative assessment of the habitat conditions supported by the drains. Descriptions of the habitat conditions of the drains surveyed for the Lowline and Trifolium Interceptor, and Completion Projects project are provided in Table 2.3-2.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Mulberry	The upstream reach of the Mulberry Drain along Rutherford Road is characterized by a narrow, deep channel, lined with rabbits-foot grass, saltgrass, and patches of bulrush. The banks of the drain are largely vegetated along the reach upstream from the drop structure near the Alamo River, although some of the vegetation was killed by herbicide. A drop structure is located about 150 feet upstream from the confluence with the Alamo River. A few scattered salt cedars and salt bushes are found on the banks of the drain channel in a highly disturbed area of mostly barren ground. The drain drops more than 10 feet to the river level. Erosion and bank slumping contribute to the barren banks in this area.
Malva II	The upper parts of the Malva II Drain are very steep-sided and exhibit bank sloughing and little vegetation. Drain bank slopes in the lower reach of the drain west of Park Road are dominated by stands of common reed and bands of bermuda grass or saltgrass. The common reed has been largely killed by herbicide application. A drain channel nears the Alamo River, there are two drop structures with a total drop of about 10 feet upstream from the discharge to the Alamo River. There are several small stands of cattails in the lower reach near the confluence.
Mayflower	The Mayflower Drain has saltgrass as the dominant cover along the steeply cut banks upstream of the first drop structure. Between the drop structure and the Alamo River, the banks of Mayflower Drain have thick stands of common reed and patches of saltgrass. The lower reach of this drain passes through a remnant band of creosote bush scrub before entering a salt cedar stand near the Alamo River. This drain is filled with a dense stand of cattails.
Marigold	The banks of the Marigold Drain are highly disturbed in the lower reach. Debris and grading of the banks have removed most of the vegetation near the Alamo River. Farther upstream are thin banks of saltgrass and dense patches of common reed occur along the banks. The drain passes through agricultural lands or barren ground near the river.
Standard	Upstream from the Alamo River, the Standard Drain forms a narrow channel that parallels the perimeter road of the recently graded basins of the Upper Ramer Lank unit of the State Wildlife Management Area. A 4-foot drop structure is located at the point where the drain passes under the Southern Pacific Railroad tracks. The banks are either barren or have a saltgrass and bermuda grass cover along most of the channel. The banks' slopes are either steeply cut or shallow. Scattered stands of common reed are found on the banks. Further upstream, salt and bermuda grass form the dominant cover along the narrow channel.
Narcissus	Near the State Imperial Wildlife Management Area headquarters, the operational discharge of the Narcissus lateral enters the drain. The banks of this drain are densely vegetated with common reed, saltgrass, and several date and fan palms near the refuge buildings. The Narcissus Drain parallels the access road around the perimeter of Lower Ramer Lake. The drain is mostly a shallow cut, less than 3 feet deep and is adjacent to remnants stands of creosote bush scrub. Near the drain are scattered stands of iodine bush. The lower portion of the drain has a thin strand of curly dock mixed with the saltgrass along the channel. Two drop structures are located near the confluence with the Alamo River. On the Alamo River floodplain, the drain passes through a thick stand of salt cedar that forms the riparian zone.

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TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Nettle	Near the confluence with the Alamo River, the banks of the Nettle Drain are generally covered by stands of common reed and saltgrass. The drain cuts deeply to the river, with the upper slopes largely barren and the lower half of the slope covered by salt and bermuda grasses. There are scattered stands of salt bush and common reed along the banks. The lateral operational discharge enters the drain near the railroad tracks.
Nutmeg	A thin stand of saltgrass and scattered stands of common reed are found along most of this drainage channel. The common reed stands have been sprayed with herbicide.
Nectarine	Nectarine Drain is characterized by largely barren bank slopes or patches of salt or bermuda grass for most of its length. Along the lower reach near the Alamo River, the drain has scattered common reed stands and enters the river in a shallow trough. In the Alamo River floodplain, the drain passes through salt cedar thickets, but is largely an open channel.
B Drain	B Drain is lined with stand of common reed and saltgrass along the reach from the proposed interceptor to the junction of B Drain and C Drain. The drain is generally narrow and steeply cut.
C Drain	Vegetation along C Drain is mostly saltgrass and stands of common reed. Some sections appear to be dead from herbicide spray. The extent of the saltgrass on the bank slopes along most of this drain has been controlled by herbicide.
D Drain	The drainage channel has recently been dredged in the section along State Highway 115 (Eddins Road) west of Calipatria. Dredge spoil along the canal embankment contains common reed and saltgrass. The D Drain flows parallel to Highway 115 to the confluence with the Alamo River; west of Brandt Road, D Drain is a pipeline to the Alamo River. The drain passes through a thin stand of salt cedar near the highway bridge.
Spruce No. 4	Spruce No. 4 is characterized by broad and gently sloped banks with patches of bermuda grass. Drain banks are largely devoid of vegetation along the reach upstream from the drop structure near the new River. A drop structure is located about 150 feet upstream from the confluence with the New River in an area of barren cliff banks. The drain drops more than 20 feet to the river level where there are stands of salt cedar forming the New River riparian corridor. Erosion and bank slumping contribute to the barren banks.
Spruce No. 5	Spruce No. 5 is dominated by common reed stands in the lower reach near the New River. Although it is deeply cut near the end of the drain, the upper stream reaches are broad and open and dominated by a salt and bermuda grass cover with a few salt bushes near the top of the slope.
Pinner	Saltgrass is the dominant cover along the banks upstream from the drop structure. Between the drop structure and the New River, the banks of Pinner Drain have debris and rubble piles or are largely barren. No common reed is present, but new stands of salt cedar are becoming established.
Tamarack	A cover of salt and bermuda grasses forms the dominant cover along the bank of this drain near the New River. There are only a few stand of common reed or salt cedar and even fewer salt bush clumps. The channel is only about 3 feet wide along most of the drain.
Timothy	Upstream from the New River, this drain forms a narrow channel. A drop structure is located 200 feet upstream from the confluence. The banks are either barren or have a saltgrass bermuda grass cover along most of the channel. The banks are steep with stands of common reed and some salt bush. Farther upstream, salt and bermuda grasses form a dominant cover on the slope.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Trifolium No. 2	The banks of this drain have been denuded of most vegetation in lower reaches near the river. There is bank slumping and disturbance along the channel, and considerable rubble and debris on both bank slopes. Near the river is a thin stand of salt cedar and mostly barren riparian zone.
Trifolium No. 3	Near the New River, the banks of the drain are generally covered by stands of common reed and saltgrass. The drain cuts deeply to the river, with the upper slopes largely barren and the lower half of the slope covered by salt and bermuda grasses. There are scattered stands of salt bush and common reed along the banks.
Trifolium No. 4	There are lines with stands of common reed and saltgrass along most of channel. It is fairly open as there is a wide bench between the channel and the slope. The bench and slopes are mostly covered by saltgrass or bermuda grass and few stands of common reed. Near the end of the drain at the New River, the drain is deeper with an arrow 2- to 4-foot-wide channel at the bottom. The vegetation in the lower reach appears to have been sprayed with a herbicide.
Trifolium No. 5	This broad drainage channel has salt cedar and common reed along the banks. Near the New River, the drain passes through salt cedar thickets.
Trifolium No. 6	This deep drain channel is covered by common reed from the point downstream from the lateral spill to the confluence with the New River. Upstream from the lateral spill, additional stands of common reed occur.
Trifolium No. 7	Vegetation along Trifolium No. 7 is mostly saltgrass and stands of common reed; some vegetation appears to be dead from herbicide spray. The extent of the saltgrass cover on the bank slopes may also be limited by herbicide application.
Trifolium No. 8	The drainage channel is lined with salt cedar or is barren as a result of herbicide use. Near the channel alignment bend at the junction of Foulds Road and Lack Road, common reed and saltgrass line the banks of the 4- to 6-foot-wide ditch. Flow in the lower reach of the drain is augmented by spillage from the lateral at Gate 180E.
Trifolium No. 9	The upper reach is the broad channel about 6- to 8-feet-wide lined with saltgrass or common reed, although extensive portions appear to have been sprayed with herbicide. Spillage from the lateral mixes with the drain about 200 yards upstream of the New River. Portions of the lower channel are barren.
Trifolium No. 10	The channel width of Trifolium No. 10 is about 2 to 3 feet near Foulds Road and is lined with saltgrass, bermuda grass, and scattered stands of common reed. Near the end of the drain are trunks of dead salt cedar and stands of common reed that appear to have been killed by herbicides.
Trifolium No. 11	The drainage channel is about 7-feet wide near the confluence with the New River. The banks along the drain are lined with saltgrass and stands of common reed.
Trifolium No. 12	Along the lower reach of Trifolium No. 12, north of Foulds Road, the drain is lined with thick stands of common reed and salt cedar. To the west are thick stands of salt cedar bordering ponds of the NWR and private duck clubs. Before reaching the New River, the drain bends toward the Salton Sea and flows parallel to the New River and passes through cattail stands.
Barbara Worth	Predominantly barren channel with small patches of salt cedar and salt bush. A dense thicket of salt bush and salt cedar borders the top of the drain.
Ash Lat. 18	Typical vegetation found in this drain consists of saltgrass, bermuda grass, salt bush, and salt cedar.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Ash No. 34	Saltgrass and bermuda grass are the dominant vegetative features of this drain, carpeting the lower edges of the banks.
Ash No. 30	The banks of the drain are barren except for the lower edges, where a band of saltgrass and bermuda grass lines the channel to the water line.
Ash Lat. 37	Saltgrass and bermuda grass are the dominant vegetation features of this drain, covering the lower edges of the channel banks.
Schenk No. 6	Typical vegetation found in this drain consists of saltgrass, bermuda grass, and salt bush.
Ash No. 25	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, salt bush, common reed, and mallow.
South Central No. 2-B	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, salt bush, common reed, and mallow.
EHL No. 1	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
EHL No. 6	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
EHL No. 7	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow
Bonds Corner	At the proposed interceptor location, common reed is the dominant vegetative type in this drain. Saltgrass is found at the lower edges of the banks along the water line.
Verde No. 1	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Verde No. 2	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Whitcomb No. 3	Typical vegetation found in this drain includes common reed, saltgrass, bassia, salt bush, and juncus. Common reed is found in thick stands at scattered locations along this drain.
Hemlock Lat. 4	This contains vegetation common to drains and ditches in this area, such as common reed, saltgrass, bermuda grass, salt bush, and mallow.
Peach	Typical vegetation found in the drain includes saltgrass, salt bush, bermuda grass, and mallow.
Pampas	Salt cedar and common reed are found intermittently along the banks. Saltgrass and bermuda grass form a carpet along the lower edges.
Palmetto	Saltgrass and bermuda grass are the dominant plant species found in this drain. Salt cedar, salt bush, and common reed can be found interspersed along the banks.
Pear No. 2	The banks of this drain are predominantly bare, except for the lower edges, which are covered with a thick layer of saltgrass and bermuda grass. Salt bush is found occasionally along the top of the banks.
Warren	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 8	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.

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TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
EHL No. 10	Saltgrass and bermuda grass form a dense cover along the bottom and lower edges of this drain, obscuring the water level. Mexican sprangletop and salt bush are found occasionally mixed within this stand.
EHL No. 11	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 12	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 13	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 14	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
EHL No. 15	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orita	Vegetation cover in this drain is predominantly saltgrass and bermuda grass.
Ohmar	The banks of this drain are mostly covered by saltgrass and bermuda grass, with patches of heliotrope, salt bush, and bassia growing along the upper reaches of the bank.
Orange	Dominant plant species along this drain are saltgrass and bermuda grass, forming a dense carpet along the lower edges. Small stands of salt bush and five-hook bassia are interspersed along the drain.
Oxalis	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Olive	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orchid	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Holtville	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Occident	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orient	This contains sparsely vegetated with salt cedar and salt bush. Past herbicide use is evident by the dead vegetation along the upper reaches of the bank.
Munyon	Dominant plant species along this drain are common reed, salt bush, and saltgrass. Saltgrass and bermuda grass form a dense carpet along the lower edges of the bank in spots. In the Alamo River floodplain, a section of this drain has extensive debris piles along the tops of its banks.
Myrtle	Typical vegetation found in this drain are salt cedar, salt bush, saltgrass, and bermuda grass. The saltgrass and bermuda grass inhabit the lower edges of the drain towards the water line, forming a thick layer.
Mullen	Saltgrass and bermuda grass cover the lower edges of this drain, with salt bush and curly dock interspersed among the sloping banks.

TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Maple	This is vegetated primarily with saltgrass and salt bush, with some juncus growing along the water's edge.
Mesquite	Common reed is the dominant cover type in this drain, forming dense stands in some areas. Salt cedar and saltgrass are also found interspersed among the common reed.
Magnolia	Dominant plant species along this drain are common reed and salt bushy. In some sections of the drain, common reed was growing so densely as to obscure the bottom.
Moss	A light covering of saltgrass covers the lower half of this drain along the steep banks. Common reed has also established itself along this drain, occasionally growing in thick patches.
Oak	At the proposed interceptor location, the banks of this drain are predominantly bare with scattered patches of saltgrass and bermuda grass.
Osage	This contains vegetation common to drain sand ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Lewis	This contains vegetation common to drains and ditches in this area, such as saltgrass, bermuda grass, common reed, salt bush, and mallow.
Orita	Vegetation cover is predominantly saltgrass and bermuda grass.
North Central	The banks of this drain were typically vegetated only at the bottom with saltgrass and bermuda grass. Some sections of the drain contained a thick stand of common reed, while other sections were bare banks with plant species such as mallow and heliotrope interspersed along the top.
Rice	The dominant plant cover in this drain was a mat of saltgrass and bermuda grass. Other plant species include heliotrope, salt bush, and mexican sprangletop.
Rice No. 3	At this proposed interceptor location, the banks of this drain were predominantly bare, with only scattered occurrence of established plants such as mallow or salt bush.
Rice No. 4	Saltgrass and bermuda grass are the dominant vegetative feature of this drain, covering the lower edges of the banks.
Rice No. 14	Saltgrass and bermuda grass are the dominant vegetative feature of this drain, covering the lower edges of the banks.
Wildcat	Dominated by saltgrass and bermuda grass on the lower edges of its banks, with a few sparse patches of salt bush and baccharis growing along the slopes.
Cook	Common plant species found along this drain include common reed, mexican sprangletop, and saltgrass, which form a dense cover on the lower edges.
Sumac	At the proposed interceptor location, the western portion of the canal is heavily vegetated, primarily with salt bush and salt cedar.
Fillaree	At the proposed interceptor location, this drain is heavily vegetated with salt bush as the dominant cover type. Saltgrass, bermuda grass, and some salt cedar are interspersed along the lower edges of the banks.
Dixie	Common reed and salt bush are the dominant vegetation types in this drain. Sparse patches of cattail and sedge also grow along the water line and bottom of this drain.
Dixie No. 1	This is primarily vegetated with salt cedar and salt bush. Cattail, saltgrass, and bermuda grass also grow along the banks. Farther east, the banks along Dixie Drain No. 1 became deeply cut with steep slopes. Most of the vegetation occurs in the bottom of the drain channel, forming a dense thicket of salt cedar and salt bush.

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TABLE 2.3-2
Habitat Along Drains in the Imperial Valley

Drain	Habitat Description
Dixie No. 5	Vegetation along Dixie No. 5 is mostly saltgrass and bermuda grass; however, some sections of this drain are heavily vegetated with cattail and sedge. Salt bush, salt cedar, bassia, and mexican sprangletop also occur along this drain.
Fern Canal	The banks of this drain are primarily vegetated with dead and live bassia, salt bush, and saltgrass.
Fig	Plan species common to this drain include salt cedar, common reed, saltgrass, and sedge. Small, intermittent patches of saltgrass and sedge occur close to the water line.
Wormwood	Light coverings of saltgrass and bermuda grass occur on the predominantly barren banks. Salt bush, mexican sprangletop, common reed, and salt cedar are also found in varying densities along the length of this drain.
Greeson	Dominant vegetation in this drain include saltgrass, bermuda grass, and mexican sprangletop. These species grow toward the lower edges of the banks, creating a dense cover at the water line.
Greeson No. 2	Saltgrass and bermuda grass grow in a thick layer along the lower edges of this drain. Sparse patches of cattail and sedge occur intermittently.
Martin	Thick stands of cattail occur in this drain, while salt bush forms a border near the tops of the banks. In section of this drain, the emergent vegetation obscures the drain channel.
Brockman	Vegetation consists of predominantly saltgrass and bermuda grass growing at the lower edges of the bank slopes.
Brockman No. 2	Vegetation consists of predominantly saltgrass and bermuda grass growing at the lower edges of the bank slopes.
Carr	The banks slopes are largely barren, with patches of mexican sprangletop and saltgrass growing along the water's edge. Mallow and salt bush occur sparsely on the tops of the banks.
All American No. 11	The dominant plant species in this drain is saltgrass, which occurs in thick mats along the water line. Small clumps of salt bush and mexican sprangletop also occur along the banks.

NWR National Wildlife Refuge

Hurlbert (1997) also surveyed drains in the HCP area. In this study, the percent cover for each of the major plant species (e.g., *Phrgamites*, *Tamarix*, *Pluchea*, *Typha*, and *Atriplex*) and habitat type (e.g., herbaceous, bare ground, and other) was estimated in 10 drains. Each drain was surveyed by driving its length and stopping every 0.1 mile. At each stop, percent coverage for each major vegetation species (*Phragmites, Tamarix, Pluchea, Typha,* and *Atriplex*) or habitat type (herbaceous, bare ground, and other) was determined within the area extending 100 feet on either side of the point. The survey was conducted in the winter (late 1994/early 1995) and spring (late May 1995). Based on these data, Hurlbert (1997) calculated the average percentage cover of each major vegetation species in each drain separately for the winter and spring surveys. The 10 drains surveyed were distributed throughout Imperial Valley and covered about 78 miles (Figure 2.3-3).[1]

[1] Data for P Drain are believed to be reported incorrectly in Hurlbert (1997), and data from this drain were not used in this analysis. Without inclusion of P Drain, approximately 70 miles of drains were surveyed.